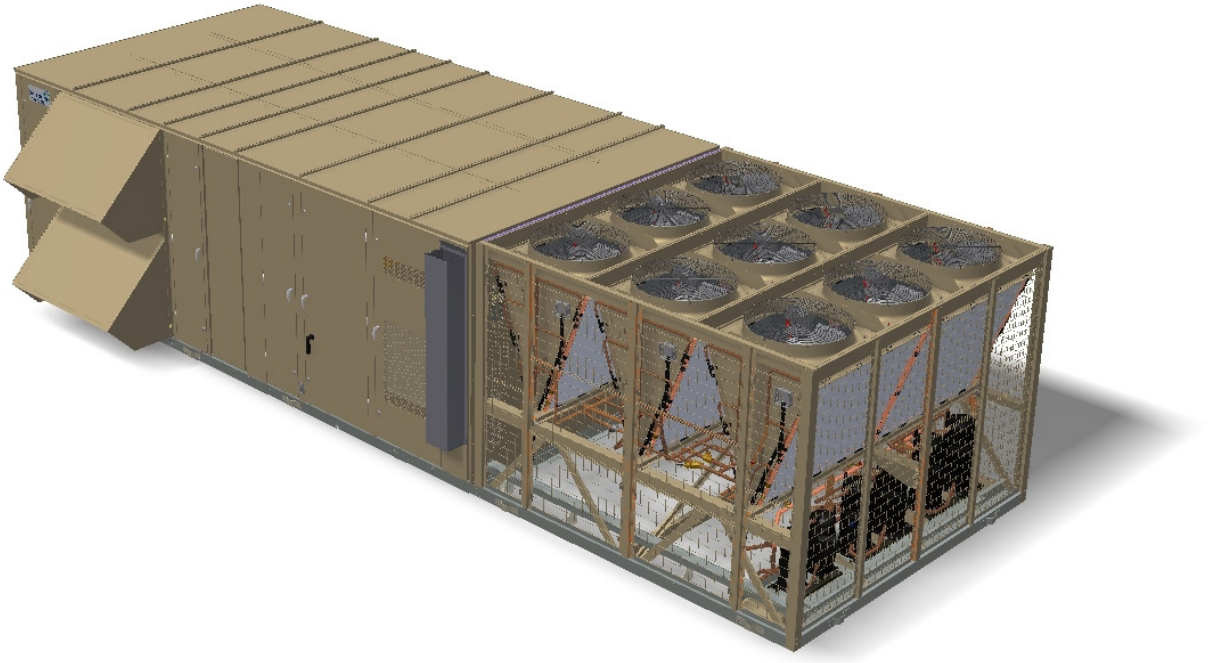
YORK® INSTALL CONFIDENCE	PACKAGED ROOFTOP UNITS	
INSTALLATION, OPERATION, MAINTENANCE	Supersedes YRK3-NOM1 (319)	Form YRK3-NOM1 (120)

035-21779-250

SINGLE PACKAGED UNITS
YPAL
MOD G



LD17804

120 THROUGH 150 TONS

Issue Date:
January 20, 2020

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of rigging, installation, and operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized rigging, installation, and operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and governmental standards and regulations pertaining to the task in question.

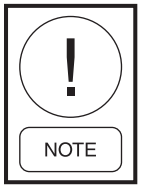
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.

Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.



Highlights additional information useful to the technician in completing the work being performed properly.

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with the manufacturer's published specifications and must be performed only by a qualified electrician. The manufacturer will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

WARNING: Cancer and Reproductive Harm—www.P65Warnings.ca.gov.

CHANGEABILITY OF THIS DOCUMENT

In complying with YORK's policy for continuous product improvement, the information contained in this document is subject to change without notice. YORK makes no commitment to update or provide current information automatically to the manual or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest YORK Service Office or accessing the YORK website at http://www.york.com.

It is the responsibility of rigging, lifting, and operating/service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the equipment.

CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Split Ship Kit Assembly Instructions	YRK3-N1
Static Pressure Probe Installation Instructions	YRK-N1
High Altitude Accessory Kit Installation Instructions	YRK-N2
YORK 50–150 Ton Rooftop Unit Start-Up Checklist	YRK-CL2
YORK 50–150 Ton Rooftop Unit Start-Up Guide	YRK-SU1
Control Sequences Start-Up Guide	YRK-SU2

NOMENCLATURE

BASE MODEL NUMBER

1 2 3 4 BASE PRODUCT TYPE
- Y : YORK
- P : Packaged Rooftop
- A : Air-Cooled
- L : Scroll

5 6 7 NOMINAL CAPACITY
- 1 2 0 : 120-ton
- 1 3 0 : 130-ton
- 1 5 0 : 150-ton

8 9 APPLICATION
- C : Cooling Only
- N : Natural Gas Heat
- G : Natural Gas Heat SS HX
- M : Modulating Gas Heat
- E : Electric Heat
- S : Steam Heat
- H : Hot Water Heat
- R : Hot Gas Reheat
- V : VAV or SZVAV

10 REFRIGERANT
- E : R-410A

11 12 VOLTAGE
- 4 6 : 460 / 3 / 60
- 5 8 : 575 / 3 / 60

13 14 DUCT LOCATIONS
- B : Bottom Supply
- L : Left Supply
- R : Right Supply
- B : Bottom Return
- R : Rear Return
- S : Side Return

15 16 DESIGN SPECIAL
- G
- X : Std. Product, IPU
- S : Special Product, IPU

17 GAS HEAT CAPACITY
- N : No Gas Heat
- L : Low (375 MBH)
- M : Med (750 MBH)
- H : High (1125 MBH)

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SECTION 1–INTRODUCTION

ECOLOGICAL AND ECONOMICAL DESIGN

Lower Total Cost of Ownership

- Fully modulating gas heat and greater steps of capacity control offer superior off-design performance while maintaining optimum occupant comfort.
- Accurate ventilation control ensures that no more than the proper amount of ventilation air is utilized. This avoids the energy cost of conditioning excess outside air and simultaneously monitors all other unit functions for maximized energy efficiency.
- Flexible design configurations simplify the design process and allow the YORK® 120–150 ton rooftop units to be applied to virtually any building application.
- Accessibility through double-wall access doors, spacious compartments and supportive floors improves serviceability.

INDOOR AIR QUALITY (IAQ)

Indoor Air Quality Features for Indoor Environment

- A double-sloped stainless steel drain pan with a single drain connection ensures that all condensate is voided from the drain pan. It is also visible and accessible for periodic inspection and cleaning required by the ASHRAE 62 IAQ standard.
- Double-wall construction of the roof, floor, doors, and walls prevents insulation fibers from entering the conditioned air. The inner liner also facilitates periodic cleaning of the unit to prevent harmful build-up of bacteria or contaminants.
- The rooftop Unit Controller control center uses microprocessor logic to analyze and optimize ventilation decisions and perform demand ventilation, and airflow compensation.

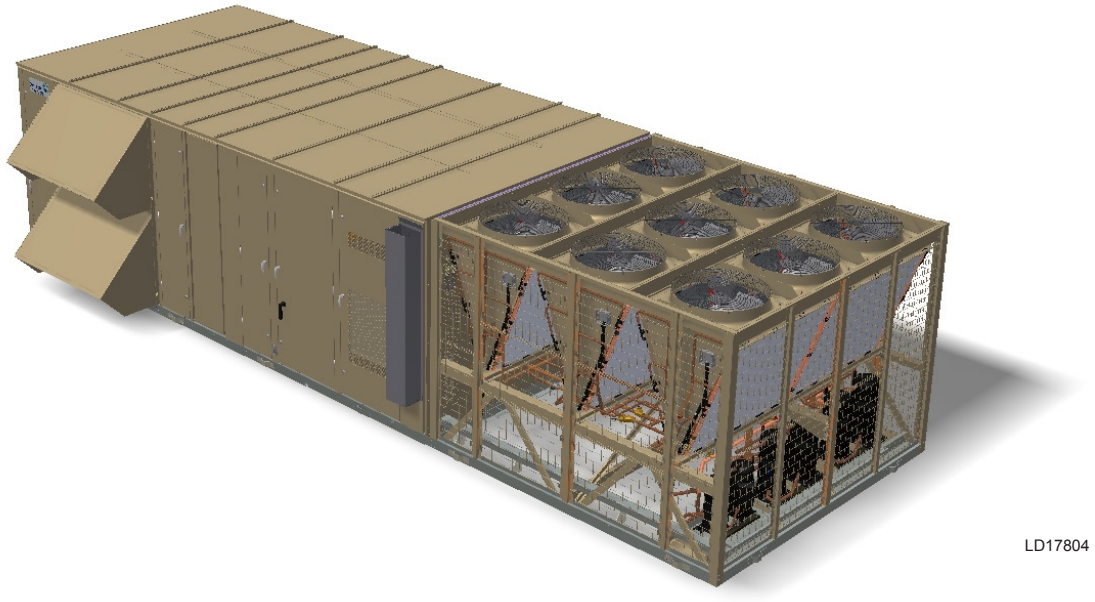

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FIGURE 1 - PACKAGED ROOFTOP AIR CONDITIONING UNIT

CONDENSING SECTION

Scroll Compressors

Reliable, efficient, trouble-free operation is the true measure of a packaged rooftop's value. That's why YORK 120–150 ton rooftop air conditioners use established scroll-compressor technology to deliver dependable, economical performance in a wide range of applications. With the packaged rooftop unit, you get the latest generation of compressor enhancements added to the scroll's inherent strengths. The simplicity of a hermetic scroll compressor allows the use of fewer moving parts to minimize breakdown.

Multiple Compressor Staging

Through the use of the scroll compressor, the unit has the ability to stage its cooling by enabling and disabling multiple single stage compressors on multiple circuits. These compressors are manifolded together in three independent circuits.

Compressor Circuiting

The unit is designed so that only 2 scroll compressors are in tandem within one refrigeration circuit. This means more reliable compressors, and less equipment down time. With multiple circuits, if a compressor should ever fail on one circuit, the other circuit/s will remain operational to work to maintain occupied loads. The system has three circuits in a unit.

Compressor Sound Blankets

Optional factory installed sound blankets can be installed to further reduce compressor sound attenuation.

Replaceable Core Filter Driers

The optional replaceable core filter driers on the unit provides a convenient means for maintaining and optimizing the units' refrigeration system. Eliminating additional field penetrations into the refrigerant circuit, which could lead to potential problems, reduce the worry of refrigerant circuit contamination.

Low Ambient

The unit comes standard with mechanical cooling operation down to 50.0°F. For mechanical cooling operation below 50.0°F, a low ambient kit is required.

Condenser Fan Motors

The condenser fan motors used on the unit are Totally Enclosed Air Over (TEAO) to provide maximum durability through any season.

Condenser Coils

Condenser coils are microchannel type and made of a single material to avoid galvanic corrosion due to dissimilar metals. Coils and headers are brazed as one piece. Integral sub cooling is included. The design working pressure of the coil is 650 PSIG (45 bar).

Condenser Coil Protection

The unit is available with either a wire mesh covering or louvered panels for optimum coil protection. In applications where unauthorized personnel may have access to the units, or the units may be susceptible to severe weather conditions such as hail, the louvered panel provides protection around the entire condensing section giving the maximum protection to the coils and refrigerant components.

HEATING SECTION

Gas Heat Design and Control Options

Includes an unsurpassed 24:1 turndown modulating gas furnace, and staged heating control. A Staged furnace is also available in six step furnaces.

Staged Gas Heat

The rooftop gas furnace is an induced-draft gas furnace designed for high efficiency and reliability. The furnace uses an aluminized steel tubular heat exchanger and operates at temperatures sufficient to prevent acidic exhaust gases from condensing in the heat exchanger at low fire rates, unlike drum and tube style furnaces that generate condensation formation.

Electric

The unit is also available with an electrical heater that can range from 80kW to 240kW. Depending on the size of the heat required, the unit can have three to six steps of control helping to provide tighter control of the supply and zone conditioned air. With the utilization of this multi-step function, the unit can effectively reduce energy consumption by bringing on smaller stages of heat while maintaining the maximum level of comfort.

AIR MANAGEMENT

DWDI Airfoil Fans

High efficiency fans are used to improve application flexibility, and address sound and application concerns.

Building Pressure Control

Return fans, exhaust fans, and barometric relief dampers are available to meet building pressure control requirements. Select the most appropriate option for a given application.

Variable Frequency Drives

When a VAV unit is ordered, the unit comes standard with variable frequency drives (VFDs). The VFD can optimize a systems performance by modulating the supply fan motor speed to reduce energy consumption by as much as 40% while maximizing occupant comfort.

Fan Spring Isolation

Two-inch spring isolation is used to prevent vibration transmission from the rooftop unit's supply fan to the building.

CONTROLS

Rooftop Controller

The ColdFire™ processor-based controller uses the latest in processor technology to provide the highest level of rooftop control with BACnet open protocol communication capabilities. An 80-character display and keypad are standard for simple, and easy to understand manipulation of control setpoints and readout of operating parameters and diagnostics. Shutdown and alarm faults are all recorded in memory, and include a time and day stamp for easy troubleshooting.

BACnet

The unit can be adapted to operate with any building automation system that is BACnet compatible making it the most flexible large commercial rooftop units on the market.

INDOOR AIR QUALITY

Double Sloped Stainless Steel Drain Pan

The unit's standard Stainless Steel drain pan meets ASHRAE 62 requirements for condensate drainage to improve indoor air quality. Solid wall liners encase insulation and prevent moisture from damage. Additional benefits include easy cleanability and isolates insulation from conditioned airstream.

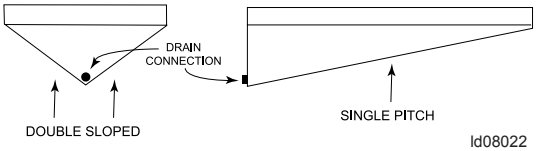


FIGURE 2 - DOUBLE SLOPED SS DRAIN PAN

NOTE

This is a visual reference only. Actual drain pan pitch will vary.

Double Wall Construction

This is the standard construction of the YORK 120–150 ton rooftop unit and incorporates powder coated pre-fabricated outer panels and corner post for maximum exterior surface protection.

Factory Shrinkwrap

All packaged rooftop units can be ordered from the factory with factory-fresh shrinkwrap packaging. No longer does the contractor need to worry about dirt and debris clogging up condenser coils or moisture leaking into the air handler on the units way to the job site or rigging yard.

Demand Ventilation

This can be incorporated into the unit to improve indoor air quality and help manage indoor pollutants such as CO_2 or other harmful airborne contaminates out of the occupied spaces for maximum comfort and safety. Activation of this sequence can easily be accomplished using CO_2 sensors connected to the unit. The rooftop Unit Controller includes two analog inputs for sensors to sense indoor and/or outdoor CO_2 levels to maintain optimum occupant comfort and safety. The CO_2 sensors are typically used with demand ventilation, however other sensors may be applied to control indoor contaminants such as volatile organic compounds (VOCs).

Smoke Purge

This is also available through the User Interface to evacuate smoke due to fire from a room or zone.

Filtration

The rooftop unit can be ordered with various types of filtration to meet the different needs and requirements of today's buildings. Filtration types include; 2" pleated filters, 2" carbon filters, 2" cleanable filters and a combination of 2" pleated pre-filters with 12" pleated filters in different MERV ratings. The units can also be ordered with post filters with the extended cabinet option.

ELECTRICAL

Single Point Power

The unit comes standard with single point power connections to make installation quick and easy.

Dual Point Power

This can be factory installed for applications that require the mechanical heating and cooling functions to be separated from the air handling functions. This enables the unit to be operated in an emergency condition while minimizing power consumption.

Unit-Mounted Disconnect

This is available as an option to minimize time at installation of equipment and to reduce necessary field installed items.

SERVICE AND INSTALLATION

Access Doors

Full-sized access doors provide easy access into the unit for routine maintenance and inspection.

Service Valves

Oversized service valves to provide isolation and quick reclamation and charging of system refrigerant are available to minimize downtime and simplify the service and repair task.

Convenience Outlet

For maintenance tasks requiring power tools, an optional 110V GFCI power supply can power lights, drills or any other power hand tool needed.

Factory Run-Tested

Each unit is subjected to a series of quality assurance checks as well as an automated quality control process before being run-tested. Fans and drives are balanced at the factory during testing. The factory run-test ensures safe proper operation when the unit is installed, and reduces installation and commissioning time.

Rain Hoods Rotate Into Place

No more bulky, field-installed rain hoods. YORK 120–150 ton rooftop unit rain hoods ship flush against the unit, and move into position with the insertion of a few screws and caulk along the side seams.

Replaceable Core Filter Drier Option

This provides a means to remove moisture, dirt and debris from the refrigeration circuit in the event it is opened.

Split Ship Option

The 120–150 ton units have the option of being shipped in a split arrangement, air handling and condensing sections separate for ease of rigging into place.

SECTION 2–INSTALLATION

APPROVALS

Design certified by ETL, CETL as follows:

- For use as a forced air furnace with cooling unit (gas heat models).
- For outdoor installation only.
- For installation on combustible material and may be installed directly on combustible flooring over Class A, Class B or Class C roof covering materials.
- For use with natural gas or LP.
- When used with LP propane gas one of the following conversion kits must be installed before the gas heat section is fired:

  1,125,000 BTU Input - 385-01866-003

Not suitable for use with conventional venting systems.

LIMITATIONS

The installation of this unit must conform to local building codes, or in the absence of local codes, with ANSI 223.1 Natural Fuel Gas Code and /or CAN/CGA B149 installation codes.

In U.S.A.:

- National Electrical Code ANSI/NFPA No. 70, latest edition.
- National Fuel Gas Code Z223.1, latest edition.
- Gas-Fired Central Furnace Standard ANSI Z21.47, latest edition.
- Local gas utility requirements.

Refer to *Table 1* for voltage limitations.

TABLE 1 - VOLTAGE LIMITATIONS

NOMINAL VOLTAGE	UNIT POWER SUPPLY	VOLTAGE VARIATIONS	
		MIN. VOLTS	MAX VOLTS
480	460V/3Ph/60Hz	414	506
600	575V/3Ph/60Hz	518	632

If the VAV boxes in the conditioned space have hydronic heating coils installed, it is the responsibility of the installing contractor to take appropriate measures to protect the hydronic coils against low unit supply air temperatures that could result in the freeze up and rupture of the coils.

UNIT INSPECTION

Immediately upon receiving the unit, it should be inspected for possible damage, which may have occurred during transit. If damage is evident, it should be noted in the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once.

To ensure warranty coverage, this equipment must be commissioned and serviced by an authorized YORK® service mechanic or a qualified service person experienced in packaged rooftop installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as HP cut-out settings, design working pressures, and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panels. Before servicing, open and tag all disconnect switches.

SPLIT SHIP OPTION

For units ordered as a split ship, please refer to the provided *Split Ship Assembly Kit Instructions (Form YRK3-N1)*.

DOOR HANDLES

Due to a shipping width requirement, some of the door handles must be removed from the unit before leaving the factory. The handles will be shipped loose for field installation. Please refer to *Figure 3 on page 18* for handle locations. The handles will be in a ship loose bag located inside the control panel.

Using the handles provided, place the handles on the door closures, using the screws and caps provided to secure the handles to the door closures.

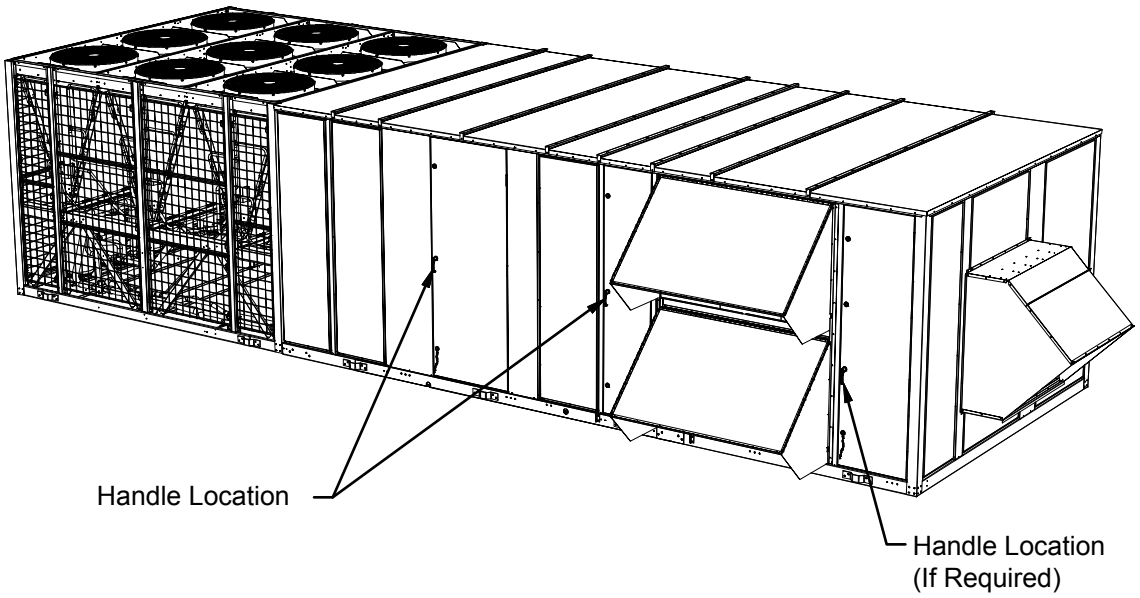


FIGURE 3 - HANDLE LOCATION

LOCATIONS AND CLEARANCES

The following guidelines should be used to select a suitable location for unit installation:

- Unit is designed for outdoor installation only.
- Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
- Suitable for roof mount on curb.
- Roof structures must be able to support the weight of the unit and its accessories. Unit must be installed on a solid level roof curb or appropriate angle iron frame.
- Maintain level tolerance to 1/2 inch across width and 2 inches along the length.

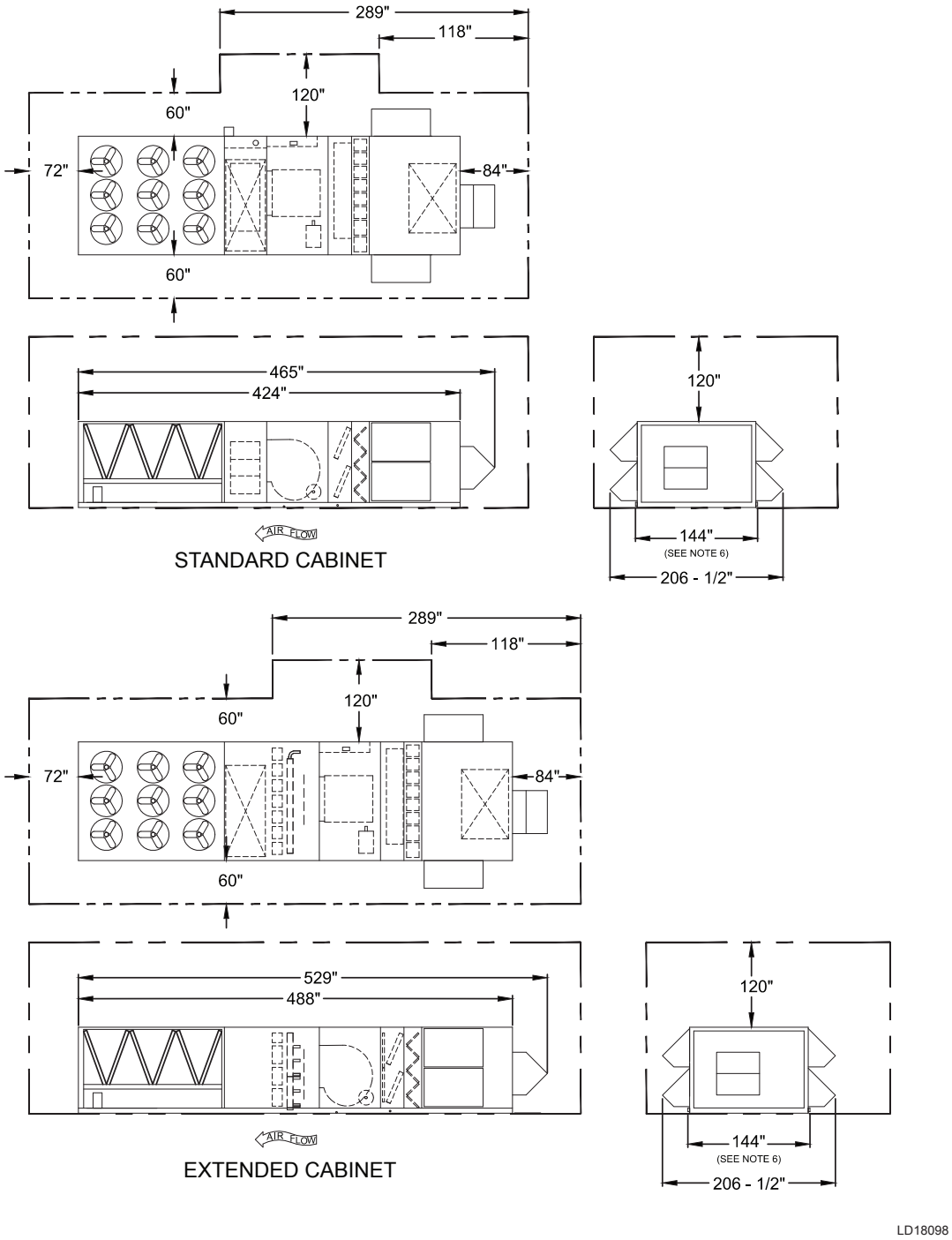
Unit clearances are shown in *Figure 4 on page 19*.

NOTE

The clearances shown are to provide adequate condenser airflow and service access to inside the unit. Additional clearance should be considered for component replacement such as compressors, evaporator coils, and supply or exhaust fans.

CAUTION

While it is a common practice to operate the fan as soon as possible (air movement during construction) on the job site, the incomplete ductwork and missing diffuser grilles will greatly reduce air resistance and will allow the fan to operate beyond design parameters. This practice may result in water carry over and flooding of the unit. Also, the supply fan motor may overamp and become damaged.



NOTES:

1. 10' clearance minimal over the top of the condensing unit.
2. Only one adjacent wall can exceed unit height.
3. 12' clearance required to adjacent units.
4. 10' clearance required where shown for coil pull.
5. Outside air hoods are folded for shipment.
6. Dim. is to outside of lifting lugs.

FIGURE 4 - UNIT CLEARANCES

RIGGING, HANDLING, AND LIFTING

Rigging and lifting should only be done by a professional rigging company in accordance with a written rigging and lifting plan. The most appropriate rigging and lifting method will depend on job specific factors, such as the rigging equipment available and job site needs. Therefore, a professional rigging company must determine the rigging and lifting method to be used, and it is beyond the scope of this manual to specify rigging and lifting details.

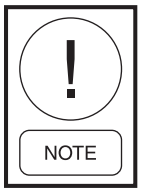
Care must be taken to keep the unit in the upright position during rigging, handling and lifting, and to prevent damage to the water tight seams in the unit casing. Avoid unnecessary jarring or rough handling.

Please refer to Warning label on the unit shrink-wrap as well as the exterior of the unit for further precautions and information. See *Figure 7 on page 22*.

Lifting lug locations are shown in *Table 2 and Figure 6 on page 21*. Lifting lug safe working load information is shown in *Figure 8 on page 22*.

Approximate unit weights can be found in *Table 3 on page 23*. For corner loads, unit centers of gravity, and unit weight, please refer to the Performance Specification sheet. If you do not have the Performance Specification sheet, please contact your YORK® sales representative.

There are eight shipping support rails and spacers installed under the base of the unit on the standard cabinet and nine shipping support rails and spacers on the extended cabinet. The rails are required for shipping because the unit is wider than the trailer bed and the side rails of the unit are not supported. THESE RAILS MUST BE REMOVED BEFORE THE UNIT IS PLACED ON THE CURB. Labels, Figure 6, are attached to the base rails to identify the locations of the support rails. The labels are located on both sides of the unit. A single screw positioned six inches in from each side fastens the support rail and spacer to the unit. The best time to remove the screws holding the support and spacer in place is just before the unit is lifted from the trailer bed to the curb.



The support rails and spacers should not be removed if the unit is not going to be installed on a curb.

On units with bottom supply, the two shipping support rails in the area of the supply air opening are used to secure a shipping closure panel. The shipping closure panel is attached to the rails and will detach from the unit with the shipping support rails.

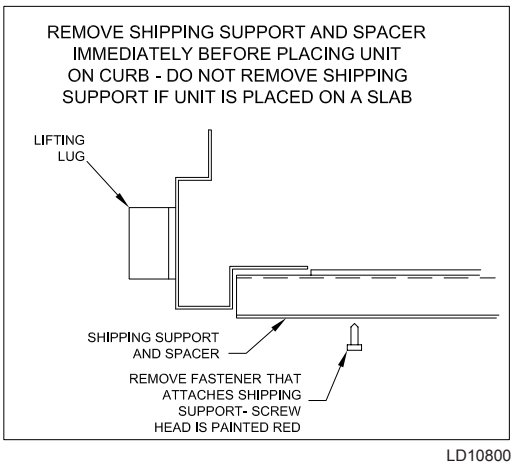


FIGURE 5 - SHIPPING SUPPORT LABEL

TABLE 2 - LIFTING LUG LOCATIONS

See *Figure 6 on page 21* For Rigging	Model	Cabinet	Lift Points Dimensions Taken From End Opposite Condenser													
Use Figure			#1		#2		#3		#4		#5		#6		#7	
			Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric
A	050	STANDARD	16.9	430	79.3	2015	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
	051	STANDARD	16.9	430	79.3	2015	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
	060	STANDARD	16.9	430	79.3	2015	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
	061	STANDARD	16.9	430	79.3	2015	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
B	050	EXTENDED	16.9	430	79.3	2015	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
	051	EXTENDED	16.9	430	79.3	2015	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
	060	EXTENDED	16.9	430	79.3	2015	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
	061	EXTENDED	16.9	430	79.3	2015	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
C	120	STANDARD	22.8	578	117.6	2981	181.9	4591	239.4	6172	296.3	7526	406.4	10323	-	-
	130	STANDARD	22.8	578	117.6	2981	181.9	4591	239.4	6172	296.3	7526	406.4	10323	-	-
	150	STANDARD	22.8	578	117.6	2981	181.9	4591	239.4	6172	296.3	7526	406.4	10323	-	-
D	070	STANDARD	29.9	759	77.0	1956	197.0	5004	270.5	6871	318.6	8093	373.8	9493	428.9	10894
	070	EXTENDED	29.9	759	77.0	1956	197.0	5004	270.5	6871	381.6	9693	436.8	11093	491.9	12494
	075	STANDARD	29.9	759	77.0	1956	197.0	5004	270.5	6871	318.6	8093	373.8	9493	428.9	10894
	075	EXTENDED	29.9	759	77.0	1956	197.0	5004	270.5	6871	381.6	9693	436.8	11093	491.9	12494
	080	STANDARD	29.9	759	77.0	1956	197.0	5004	270.5	6871	318.6	8093	373.8	9493	428.9	10894
	080	EXTENDED	29.9	759	77.0	1956	197.0	4826	270.5	6871	381.6	9693	436.8	11093	491.9	12491
	090	STANDARD	29.9	759	99.0	2515	190.0	4826	302.5	7684	353.1	8970	408.3	10370	463.4	11770
	090	EXTENDED	29.9	759	99.0	2515	190.0	4826	302.5	7684	422.1	10722	477.3	12122	532.4	13522
	105	STANDARD	29.9	759	99.0	2515	190.0	4826	302.5	7684	353.1	8970	408.3	10370	463.4	11770
	105	EXTENDED	29.9	759	99.0	2515	190.0	4826	302.5	7684	422.1	10722	477.3	12122	532.4	13522
E	120	EXTENDED	22.8	578	117.6	2981	181.9	4591	239.4	6172	307.0	7798	360.3	9151	470.4	11949
	130	EXTENDED	22.8	578	117.6	2981	181.9	4591	239.4	6172	307.0	7798	360.3	9151	470.4	11949
	150	EXTENDED	22.8	578	117.6	2981	181.9	4591	239.4	6172	307.0	7798	360.3	9151	470.4	11949

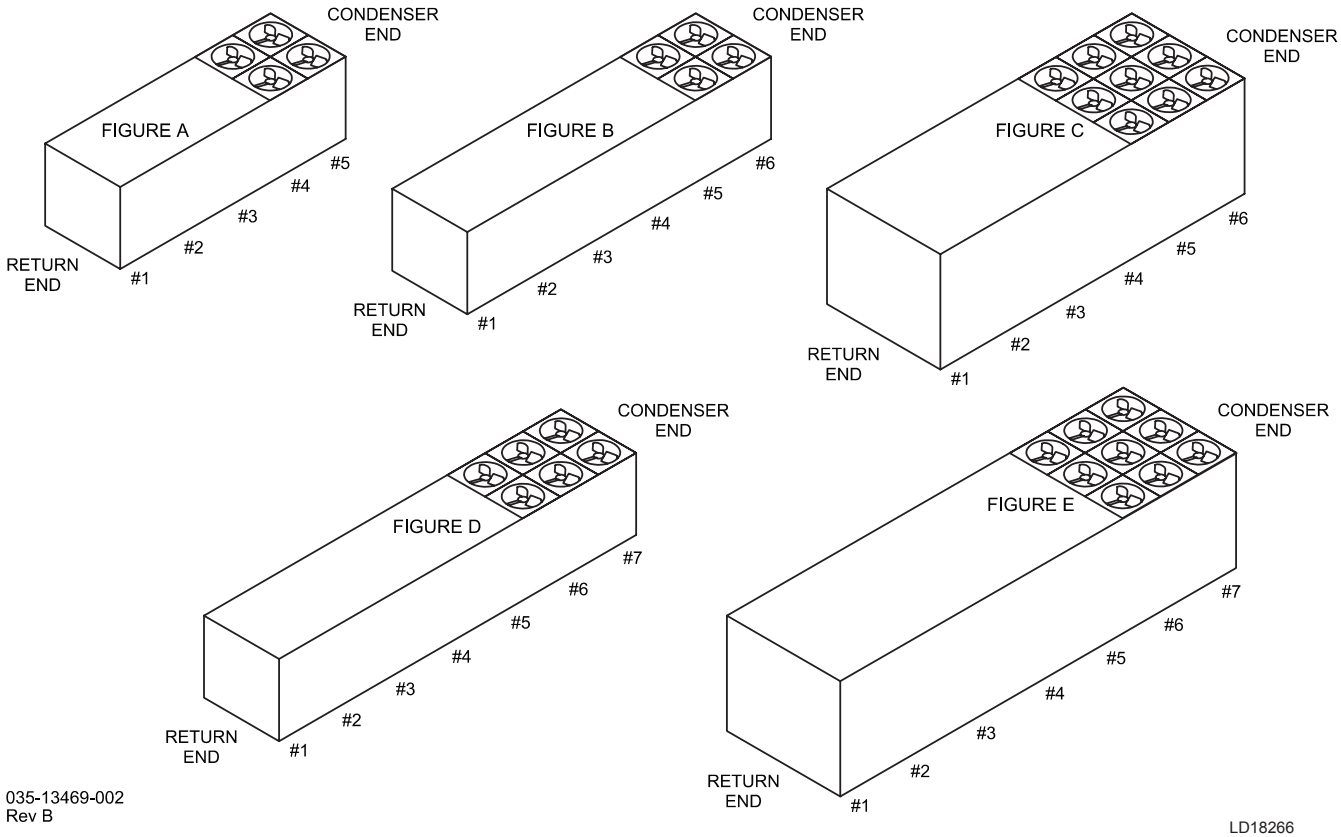
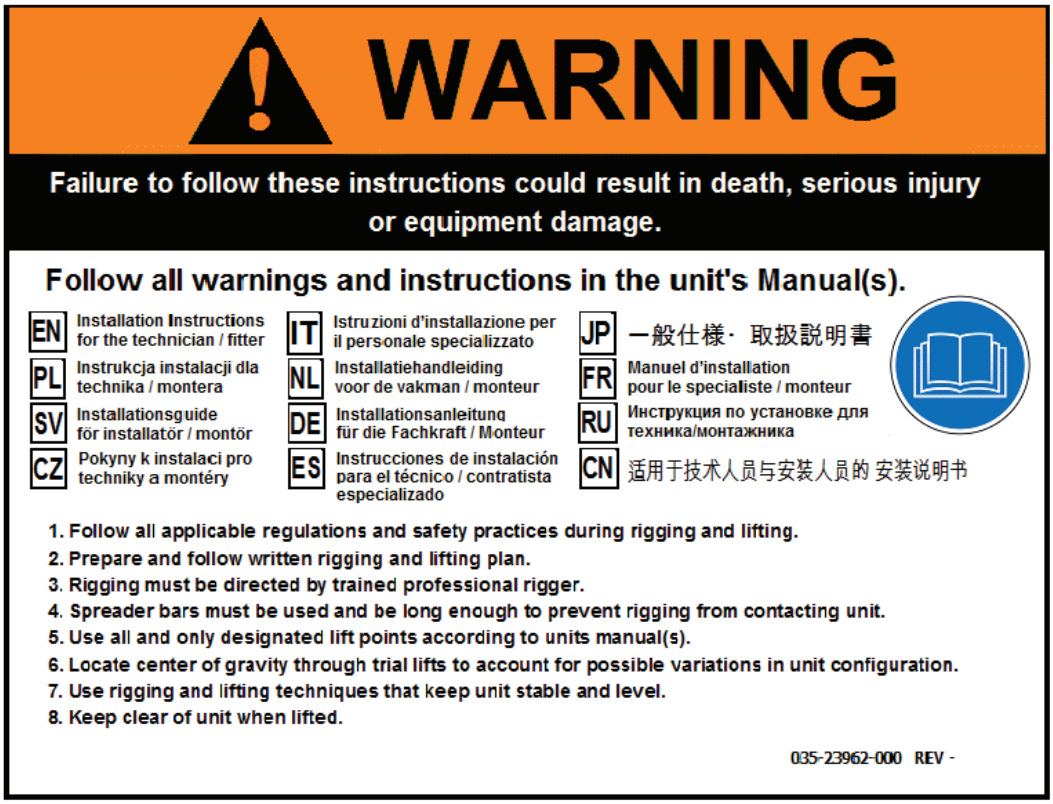
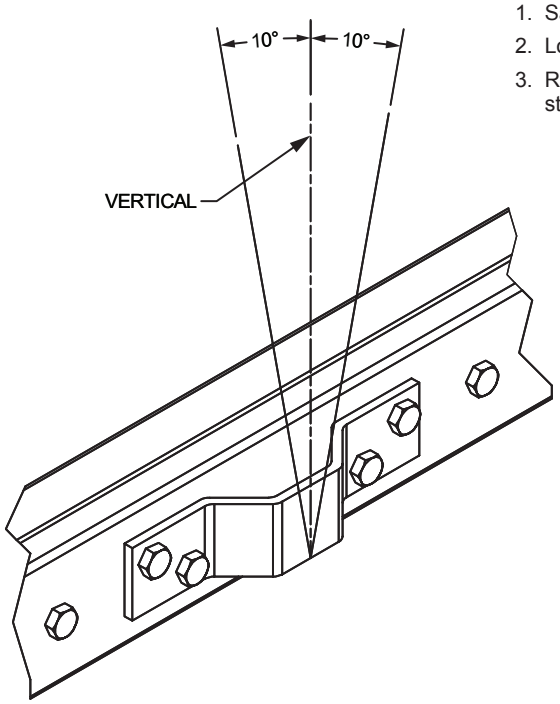


FIGURE 6 - LIFTING LUG LOCATIONS



LD18108

FIGURE 7 - WARNING LABEL



NOTES:

1. Safe Working Load of 3500 lbs each.
2. Loading shall be within 10° of vertical.
3. Rigging should be accomplished by using a fabric strap rated above the Safe Working Load.

LD19896

FIGURE 8 - LIFTING LUG SAFE WORKING LOAD

PHYSICAL DATA

TABLE 3 - PHYSICAL DATA - MODEL 120, 130, 150

MODEL SIZE		120	130	150
COMPRESSOR DATA				
Quantity/Size (Nominal HP)	Sys 1	2 x 15 HP	2 x 15	2 x 15
	Sys 2	2 x 15 HP	1 x 20 1 x 25	2 x 20
	Sys 3	2 x 25 HP	2 x 25	2 x 32
Type		Scroll	Scroll	Scroll
Capacity Steps (Qty X %)		14 Steps Between 15% and 100%	14 Steps Between 13% and 100%	14 Steps Between 12% and 100%
STANDARD CABINET REFRIGERANT CHARGE (R-410A)				
Sys 1 - Lb (Kg)		41 (18.6)	41 (18.6)	41 (18.6)
Sys 2 - Lb (Kg)		73 (33.1)	82 (37.2)	77 (34.9)
Sys 3 - Lb (Kg)		97 (44.0)	98 (44.4)	106 (48.1)
EXTENDED CABINET REFRIGERANT CHARGE (R-410A)				
Sys 1 - Lb (Kg)		43 (19.5)	43 (19.5)	43 (19.5)
Sys 2 - Lb (Kg)		75 (34.0)	84 (38.1)	79 (35.8)
Sys 3 - Lb (Kg)		100 (45.4)	101 (45.8)	109 (49.4)
HOT GAS REHEAT (HGRH) STANDARD CABINET REFRIGERANT CHARGE (R-410A)				
Sys 1 - Lb (Kg)		41 (18.6)	41 (18.6)	41 (18.6)
Sys 2 - Lb (Kg)		80 (36.3)	90 (40.8)	85 (38.5)
Sys 3 - Lb (Kg)		97 (44.0)	98 (44.4)	106 (48.1)
HGRH EXTENDED CABINET REFRIGERANT CHARGE (R-410A)				
Sys 1 - Lb (Kg)		43 (19.5)	43 (19.5)	43 (19.5)
Sys 2 - Lb (Kg)		82 (37.2)	92 (41.7)	87 (39.5)
Sys 3 - Lb (Kg)		100 (45.4)	101 (45.8)	109 (49.4)
SUPPLY FAN AND DRIVE				
Quantity		1	1	1
Type		Airfoil	Airfoil	Airfoil
Size (Inches)		40 X 40	40 X 40	40 X 40
Motor Size Range (Min. to Max. HP)		10–100	10–100	10–100
Air Flow Range (Min. to Max. CFM)		30,000–52,000	32,000–52,000	36,000–52,000
Static Pressure Range (Min. to Max. ESP)		0–4”	0–4”	0–4"
EXHAUST FAN				
Quantity		1	1	1
Type		Forward Curved	Forward Curved	Forward Curved
Size		32–32	32–32	32–32
Motor Size Range (Min. to Max. HP)		7.5–60	7.5–60	7.5–60
Air Flow Range (Min. to Max. CFM)		0–52,000	0–52,000	0–52,000
Static Pressure Range (Min. to Max. ESP)		0–2”	0–2”	0–2”
RETURN FAN				
Quantity		1	1	1
Type		Plenum	Plenum	Plenum
Size		445	445	445
Motor Size Range (Min. to Max. HP)		10–60	10–60	10–60
Air Flow Range (Min. to Max. CFM)		0–52,000	0–52,000	0–52,000
Static Pressure Range (Min. to Max. ESP)		0–2.5”	0–2.5”	0–2.5”

TABLE 3 - PHYSICAL DATA - MODELS 120, 130, 150 (CONT'D)

MODEL SIZE	120	130	150
EVAPORATOR COIL			
Size (Square Feet)	81.7	81.7	81.7
Number of Rows / Fins Per Inch	5 / 11	6 / 11	6 / 11
Tube Diameter / Surface	1/2” / Enhanced	1/2” / Enhanced	1/2” / Enhanced
CONDENSER COIL (AL & MICRO CHANNEL)			
Size (Square Feet)	261.9	261.9	261.9
Number of Rows / Fins Per Inch	1 / 21	1 / 21	1 / 21
CONDENSER FANS			
Quantity	9	9	9
Type	Prop	Prop	Prop
Diameter (Inches)	36	36	36
Power (HP Each)	2	2	2
FILTERS - 2” CLEANABLE (PRE-FILTER POSITION)			
Quantity	36 / 12	36 / 12	36 / 12
Size (Length X Width) (Inches)	16 X 20 / 20 X 20	16 X 20 / 20 X 20	16 X 20 / 20 X 20
Total Filter Face Area (Square Feet)	113.3	113.3	113.3
FILTERS - 2” PLEATED, 30% EFFICIENT (PRE-FILTER POSITION) MERV8			
Quantity	36 / 12	36 / 12	36 / 12
Size (Length X Width) (Inches)	16 X 20 / 20 X 20	16 X 20 / 20 X 20	16 X 20 / 20 X 20
Total Filter Face Area (Square Feet)	113.3	113.3	113.3
FILTERS - 2” CARBON (PRE-FILTER POSITION) MERV7			
Quantity	36 / 12	36 / 12	36 / 12
Size (Length X Width) (Inches)	16 X 20 / 20 X 20	16 X 20 / 20 X 20	16 X 20 / 20 X 20
Total Filter Face Area (Square Feet)	113.3	113.3	113.3
FILTERS - 12” RIGID 65% (MERV11); 30% PRE-FILTER (PRE-FILTER POSITION) (MERV 8)			
Quantity	7 / 21	7 / 21	7 / 21
Size (Length X Width) (Inches)	20 X 16 / 20 X 25	20 X 16 / 20 X 25	20 X 16 / 20 X 25
Total Filter Face Area (Square Feet)	88.5	88.5	88.5
FILTERS - 12” RIGID 95% (MERV14); 2” 30% PRE-FILTER (PRE-FILTER POSITION) (MERV8)			
Quantity	7 / 21	7 / 21	7 / 21
Size (Length X Width) (Inches)	20 X 16 / 20 X 25	20 X 16 / 20 X 25	20 X 16 / 20 X 25
Total Filter Face Area (Square Feet)	88.5	88.5	88.5
FILTERS - 12” RIGID 95% (POST-FILTER POSITION) (EXTENDED CABINET ONLY) (MERV14)			
Quantity	5 / 3 / 3 4 / 6 / 7	5 / 3 / 3 4 / 6 / 7	5 / 3 / 3 4 / 6 / 7
Size (Length X Width) (Inches)	12 X 24 / 16 X 20 / 16 X 25 / 20 X 20 / 20 X 24 / 20 X 25	12 X 24 / 16 X 20 / 16 X 25 / 20 X 20 / 20 X 24 / 20 X 25	12 X 24 / 16 X 20 / 16 X 25 / 20 X 20 / 20 X 24 / 20 X 25
Total Filter Face Area (Square Feet)	80.4	80.4	80.4

TABLE 3 - PHYSICAL DATA - MODELS 120, 130, 150 (CONT'D)

MODEL SIZE	120	130	150
APPROXIMATE BASE OPERATING WEIGHTS (LBS)			
Single Piece Unit	18,238	18,847	18,938
Two Piece Unit			
Air Handler Section	12,131	12,325	12,332
Condenser Section	6,096	6,510	6,597

NOTES:

Weights above are total weight excluding the curb

Standard Cabinet

Cooling Only

60HP Supply Fan with VFD

Comparative Enthalpy Economizer

Barometric Relief Exhaust

Bottom Supply and Return

2" pleated filters

Condenser Section Wire Guards

Weights represent approximate operating weights and have a +/- 10% accuracy. To obtain unit weight for a specific configuration, please refer to the Performance Specification Sheet. If you do not have a copy of this sheet, please contact your Johnson Controls sales representative.

MODEL SIZE	120	130	150
COMPONENT WEIGHTS (LBS)			
Cabinet, Air Handling Section			
Sheet Metal [1]		6,310	
Control Panel [2]		705	
REFRIGERANT			
Refrigerant Charge (R-410A)	210	230	230
COMPRESSORS			
Compressors	826	1,661	1,738
CONDENSER ASSEMBLY			
Sheet Metal		2,477	
Coils		864	
Condenser Fans		90	
Condenser Motors		450	
Condenser Grills		90	
Wire Guards		266	
Louvered Panel Guards		432	
Supply Fan Skid without Motor [3]		1,696	
Supply Fan Motor Drive		80	
MOTOR (SUPPLY/EXHAUST/RETURN)			
7.5 HP		178	
10 HP		231	
15 HP		255	
20 HP		303	
25 HP		427	
30 HP		471	
40 HP		604	
50 HP		676	
60 HP		821	
75 HP		908	
100 HP		1,243	

TABLE 3 - PHYSICAL DATA - MODELS 120, 130, 150 (CONT'D)

MODEL SIZE	120	130	150
VFD (SUPPLY/EXHAUST/RETURN)			
5–10 HP		16	
12–25 HP		27	
30–40 HP		51	
50–75 HP		77	
100 HP		110	
EVAPORATOR COILS			
Evaporator Coils	921	1,106	1,106
FILTERS			
2" Cleanable Alum		74	
2" Pleated		40	
2" Carbon		94	
Return Filter - 2" Throwaway [4]		30	
Return Filter - 12" 60–65% [4]		393	
Return Filter - 12" 90–95% [4]		388	
Final Filters		327	
ECONOMIZER			
Outside Air Dampers		255	
Outside Air Hoods		291	
Outside Air Filters		103	
Exhaust Fan Skid without Motor		1,147	
Return Fan Skid without Motor		1,574	
EXHAUST			
No Exhaust - End Panels		332	
Exhaust Fan (Damper and Hood)		516	
Return Fan (Damper and Hood)		539	
HEATING OPTIONS			
Electric Heat - 80kW		660	
Electric Heat - 108kW		680	
Electric Heat - 150kW		700	
Electric Heat - 200kW		720	
Electric Heat - 250kW		740	
Gas Heat - 1125 MBH		1,455	
Hot Water Coil (2R x 14FPI)		417	
Steam Coil (1R x 10FPI)		534	
MISCELLANEOUS			
Open Perimeter Curb		684	
Enclosed Perimeter Curb		1,110	
Airflow Measurement Option		45	

NOTES:

1. Sheet Metal, Air Handling Cabinet Cooling only.
2. Includes all options.
3. Motor Base is included in fan skid.
4. Filters only. Does not include the filter rack.

Weights represent approximate operating weights and have a +/- 10% accuracy. To calculate weight for a specific configuration, use Selection Navigator or contact a YORK sales representative.

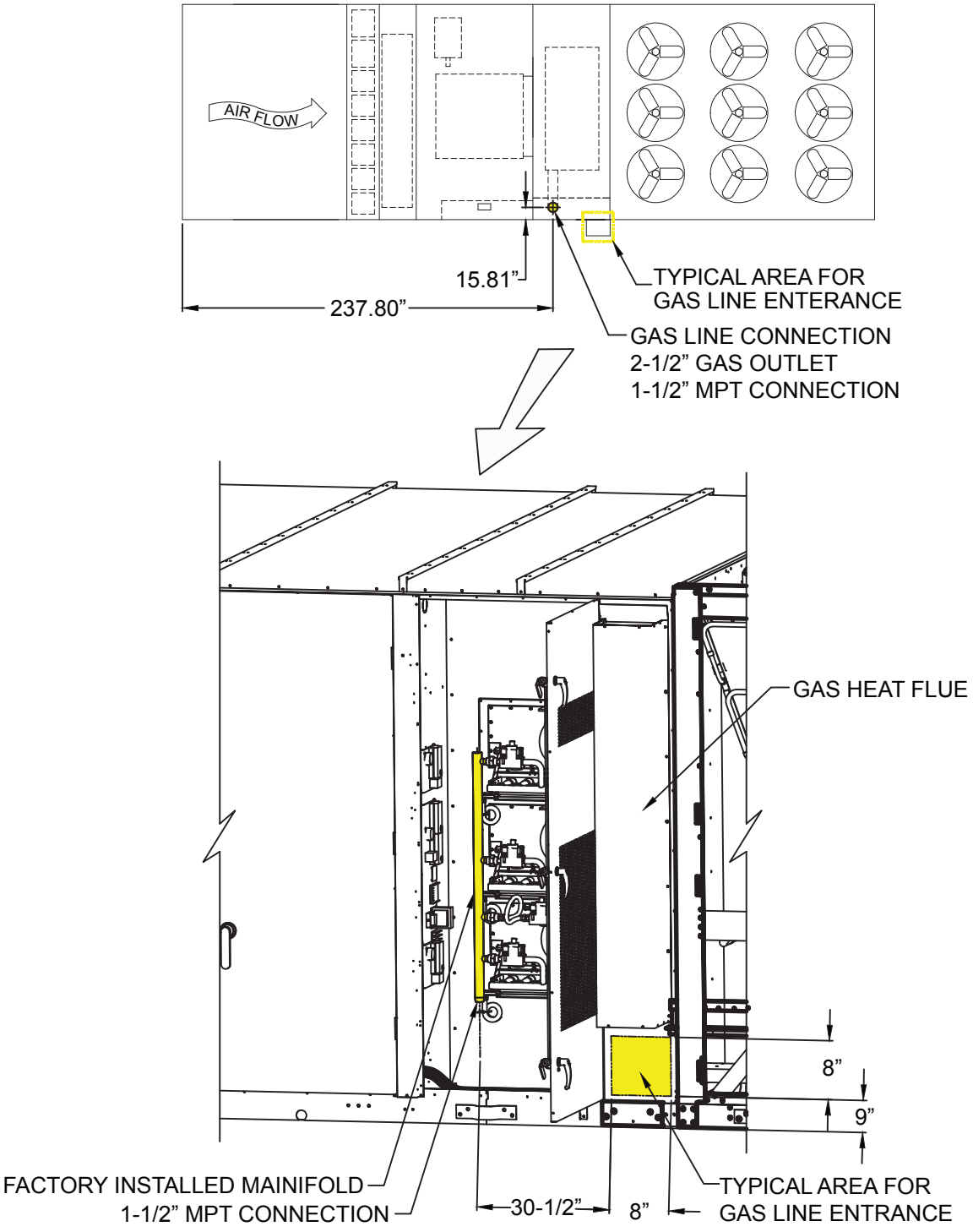
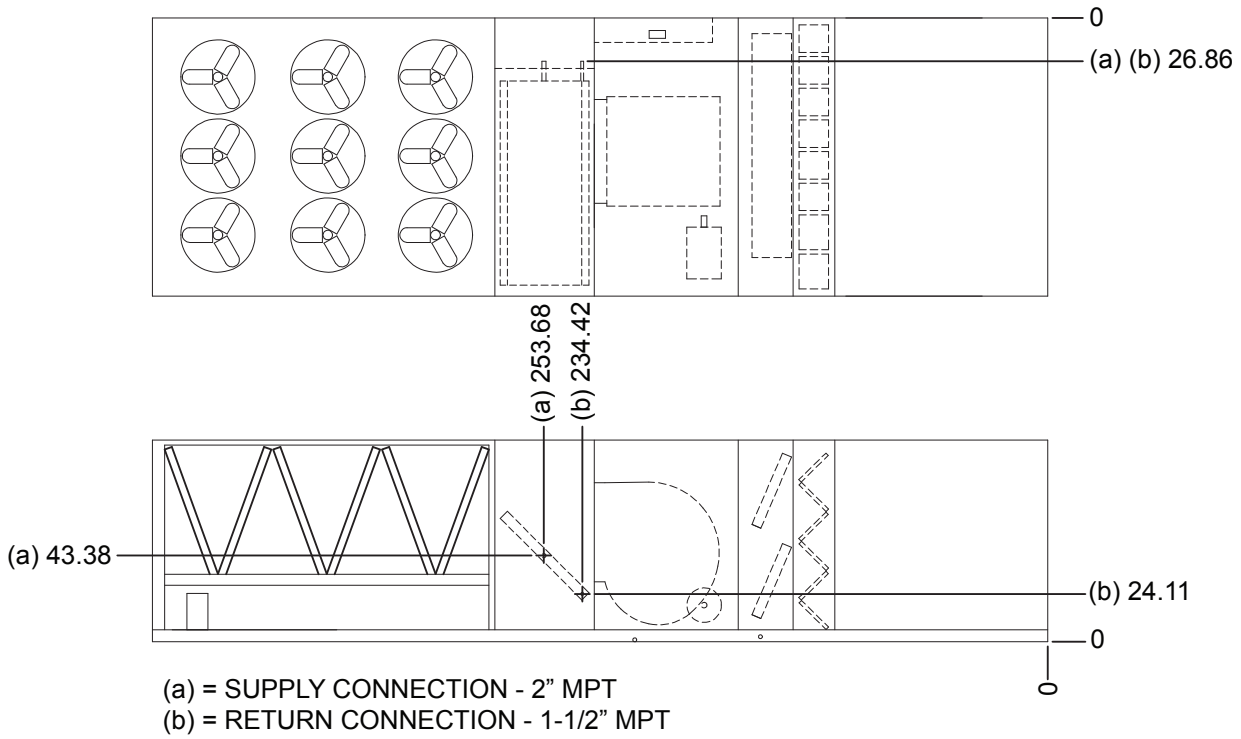
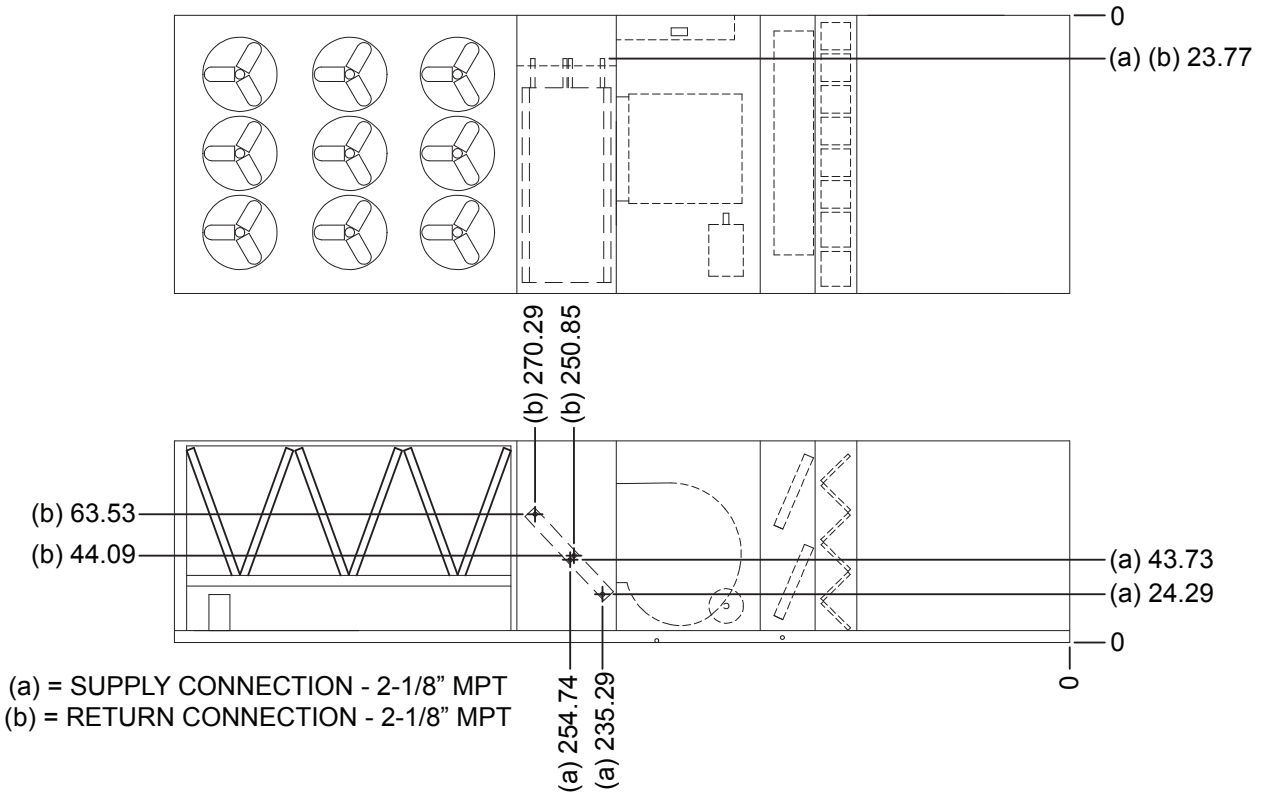


FIGURE 9 - GAS FURNACE CONNECTIONS



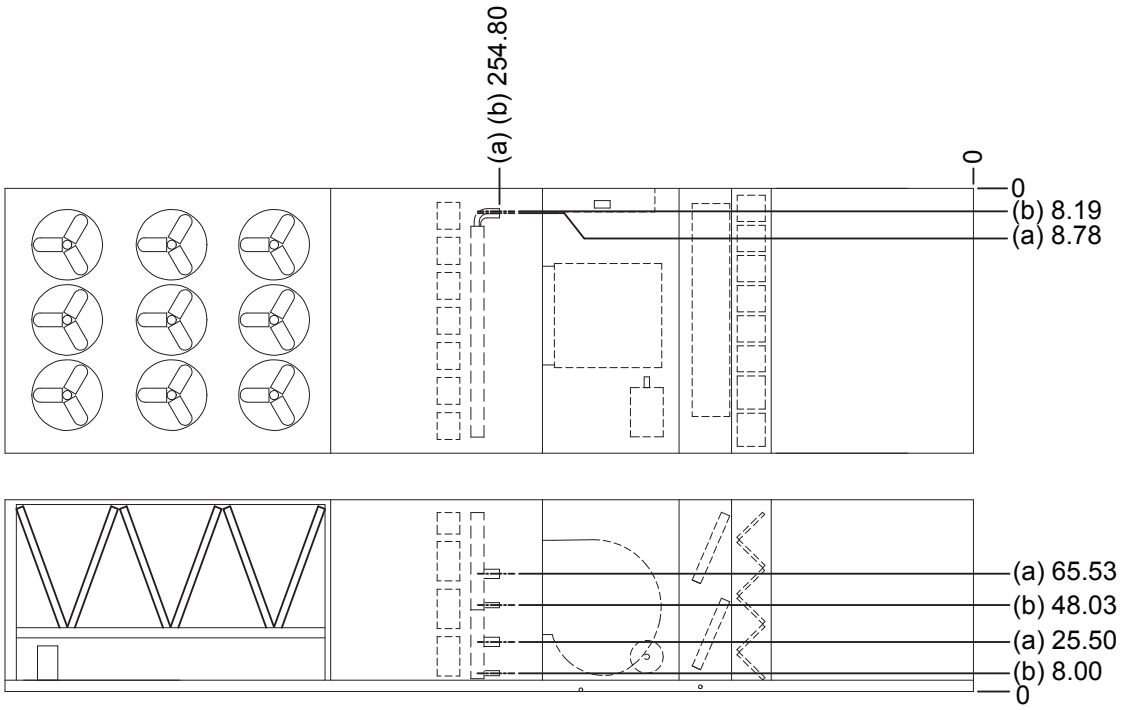
STEAM HEAT - STANDARD CABINET



HOT WATER HEAT - STANDARD CABINET

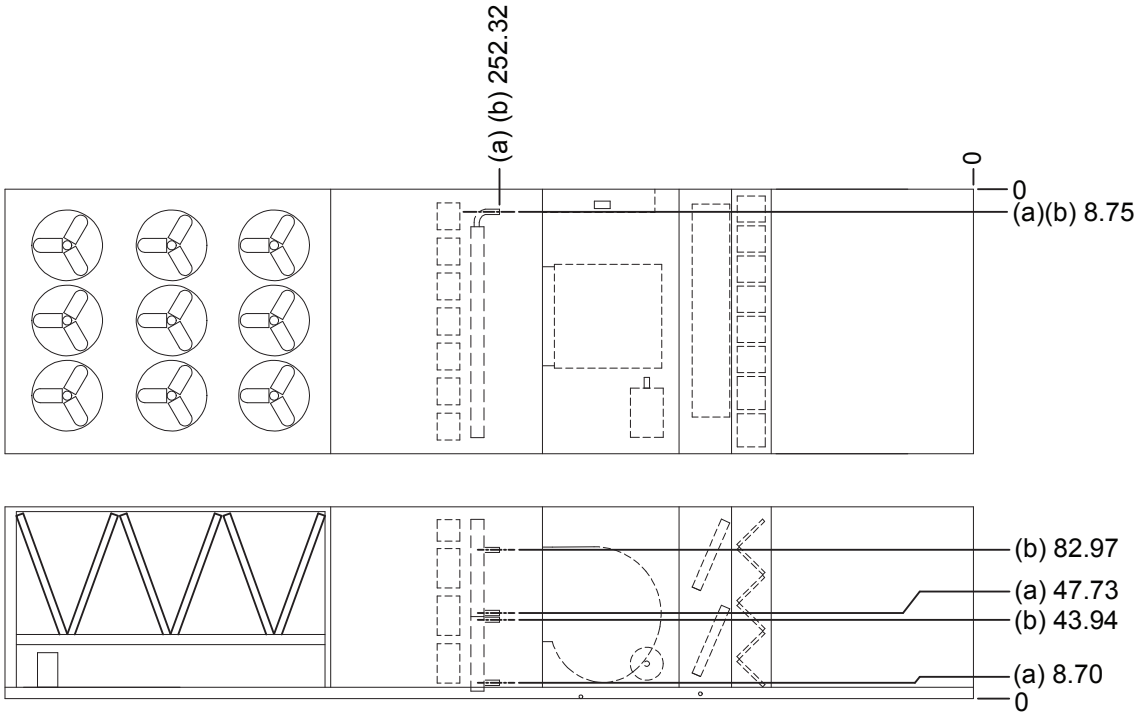
LD18100

FIGURE 10 - HYDRONIC HEAT CONNECTIONS - STANDARD CABINET



(a) = SUPPLY CONNECTION - 2” MPT
(b) = RETURN CONNECTION - 1-1/2” MPT

STEAM HEAT - EXTENDED CABINET



(a) = SUPPLY CONNECTION - 2-1/8” MPT
(b) = RETURN CONNECTION - 2-1/8” MPT

HOT WATER HEAT - EXTENDED CABINET

LD18101

FIGURE 11 - HYDRONIC HEAT CONNECTIONS - EXTENDED CABINET

ELECTRICAL DATA

Electrical Service Sizing

In order to use the electrical service required for the cooling-only packaged rooftop unit, use the appropriate calculations listed below from U.L. 1995. Based on the configuration of the rooftop, the calculations will yield different MCA (minimum circuit ampacity), and MOP (maximum overcurrent protection).

Using the following load definitions and calculations, determine the correct electrical sizing for your unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Load Definitions

- **LOAD1** is the current of the largest motor, compressor or fan motor.
- **LOAD2** is the sum of the remaining motor currents that may run concurrently with LOAD1.
- **LOAD3** is the current of the electric heaters (zero for cooling only units).
- **LOAD4** is the sum of any remaining currents greater than or equal to 1.0 amp.

Use the following calculations to determine MCA and MOP for units supplied with a single-point power connection:

MCA = (1.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

If the MOP does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for MOP is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

TABLE 4 - COMPRESSOR DATA (R-410A)

MODEL	COMPRESSOR					
	QUANTITY PER UNIT	MODEL	460/3/60		575/3/60	
			RLA*	LRA	RLA*	LRA
120	4	ZP182	26.9	173.0	23.7	132.0
	2	ZP296	37.8	320.0	34.6	250.0
130	2	ZP182	26.9	173.0	23.7	132.0
	1	ZP236	30.8	229.0	25.0	180.0
	3	ZP296	37.8	320.0	34.6	250.0
150	2	ZP182	26.9	173.0	23.7	132.0
	2	ZP236	30.8	229.0	25.0	180.0
	2	ZP385	54.5	310.0	49.4	239.0

NOTE: *RLA data is per compressor

TABLE 5 - SUPPLY, EXHAUST, AND RETURN FAN MOTOR (ODP)

MOTOR	Premium Efficiency - ODP	
	Nominal Voltage	
	460/3/60	575/3/60
HP	FLA	FLA
7.5	9.7	7.8
10.0	12.5	10.0
15.0	17.7	14.1
20.0	23.5	18.9
25.0	29.0	24.2
30.0	35.0	28.0
40.0	49.0	40.0
50.0	57.0	46.0
60.0	68.0	56.0
75.0	87.0	N/A
100.0	118.0	N/A

TABLE 6 - SUPPLY, EXHAUST, AND RETURN FAN MOTOR (TEFC)

MOTOR	Premium Efficiency - TEfc	
	Nominal Voltage	
	460/3/60	575/3/60
HP	FLA	FLA
7.5	9.4	7.6
10.0	12.0	9.6
15.0	18.5	14.8
20.0	24.0	19.2
25.0	30.0	23.9
30.0	38.0	29.0
40.0	48.0	39.0
50.0	58.0	46.0
60.0	68.0	54.4
75.0	84.9	N/A
100.0	112.0	N/A

TABLE 7 - CONDENSER FAN MOTOR FLA

FLA Each Motor		460V/3ph/60Hz	575V/3ph/60Hz
		3.4	2.7
MODEL	**Quantity of Fans**	**460V/3ph/60Hz**	**575V/3ph/60Hz**
YPAL120–150	9	30.6	24.3

TABLE 8 - ELECTRIC HEAT

kW	Nominal Voltage	
	480V	600V
	AMPS	AMPS
80	96.2	77.0
108	120.3	96.2
150	192.5	154.0
200	240.6	192.5
250	288.7	230.9

NOTES
1. Heaters will be sized as follows: 460V heaters rated at 480V, 575V heaters rated at 600V.

TABLE 9 - MISCELLANEOUS ELECTRICAL DATA

DESCRIPTION	Nominal Voltage	
	460V	575V
	AMPS	AMPS
Control Transformer, 1.5 kVA	3.3	2.6
Convenience Outlet, 2 kVA	4.4	3.5
Gas Heat, 1.5 kVA	3.3	2.6

FILTERS

Two-inch “pleated” filters are standard and factory installed in a filter rack located prior to the evaporator coil. Any optional pre-filters ordered with the unit will be shipped inside the unit, but must be field installed.

Pre-filters must always be installed ahead of the evaporator coil. Pre-filters must be kept clean and replaced with the same size and type as shipped with the unit. Dirty filters will reduce the capacity of the unit and may result in frosted coils and safety shutdowns. Required filter sizes and quantities are shown in *Table 3 on page 23*. The unit should never be operated for any length of time without the proper filters installed in the unit.

CONDENSATE DRAIN

Condensate Drain Piping

The YORK 120–150 ton rooftop unit cooling coils are located in the units so that the supply air is drawn through them. This results in the condensate being subjected to negative (-) static pressure. Unless some means of pressure equalization is provided in the condensate drain, the air rushing back through the drainpipe will cause the condensate to build up in the drain pan. As the unit continues to operate, the accumulated water will be carried with the air stream, overfilling the drain pan causing possible water leaks into the supply duct and/or causing water damage in the building. A trap must be installed to prevent this condensate water build-up (see *Figure 12 on page 32*).

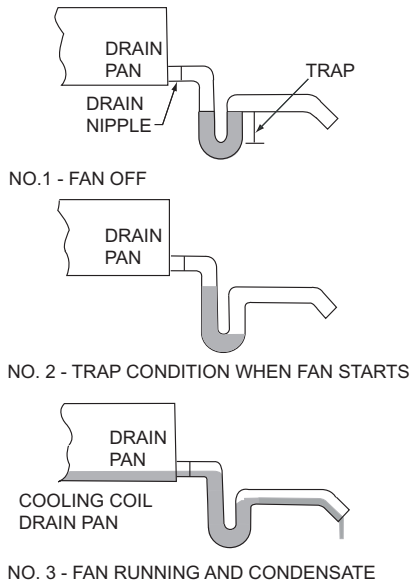


FIGURE 12 - DRAIN TRAP SHOWING WATER LOCATION DURING DRAW THROUGH OPERATION STAGES

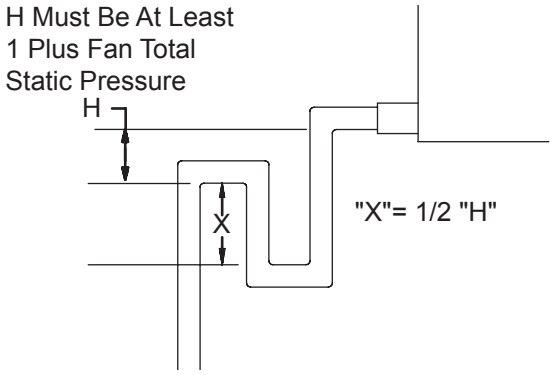


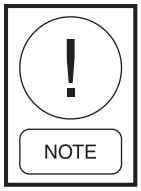
FIGURE 13 - TRAP DETAIL FOR DRAW THROUGH APPLICATION

Condensate Drain Trap

For *"Draw through"* applications, install a trapped condensate drain line at unit drain connection (*see Figure 12 on page 32*) according to all governing codes. "H" dimension must be at least 1 inch greater than design Total Static Pressure (TSP) of fan.

The 120-150 ton unit has a split condensate drain pan. There are condensate drain connections on both sides of the unit. Both of these drains must be utilized for proper condensate removal. There are also two base rails drains on these units, one on each side. Both of these base rail drains must be utilized for proper condensate removal from the base rail. Failure to install properly sized condensate traps at these four locations could cause water damage to the unit and/or the interior of the building.

The trap and drain lines should be protected from freezing. Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain lines from the 1-1/4 inch NPT female connections on the unit to an open drain.



The unit must be properly trapped and ALL traps must be primed with water before the unit is started.

AIR HOODS FOR ECONOMIZER

There are four economizer outside air intake hoods provided with the unit. The hoods are made operational per the following instructions:

- Remove the screws holding the economizer hood shipping covers in place. Discard covers.
- Apply a bead of RTV sealer along the edge of both hoods and each pivot joint to prevent water leakage.
- Rotate the hoods out (each hood is hinged). Secure the hoods with screws along the top and sides.
- Seal any unused screw holes with RTV or by replacing the screw.

AIR HOODS FOR FIXED OUTSIDE AIR (UNITS WITHOUT ECONOMIZER)

These hoods are made operational per the above procedure. The dampers may be adjusted by loosening the thumb screw, turning the lever to the desired position, and retightening the thumb screw.

AIR HOODS FOR EXHAUST AIR

When furnished, these hoods and dampers are factory installed.

FIELD WIRING

Figures 14 and 15 starting on page 35 show the field control wiring to CTB1. All field control wiring is field supplied and installed.

Space Sensor

The space sensor (if used) can be used on VAV units. For SZVAV units, only a space sensor can be used. This can be hardwired or a communicated signal. Even if a thermostat is wired to the rooftop unit, the space sensor will supply space air temperature values if connected. When mounting a space sensor, it should be located on

an inside wall approximately 56" above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. **Shielded Wire must be used that is grounded at control panel only.**

CO_2 Sensor

The optional CO_2 sensor is used for demand ventilation. When ordered, a CO_2 sensor is installed in the outdoor and return air stream.

Occupied/Unoccupied Input

CTB1 provides a point for an occupied/unoccupied input from an external source. The 24 VAC MUST be provided from the unit for proper operation. The unit can also be given an Occ/Unocc command from a BAS.

Contact Closed=Occupied

Contact Open=Unoccupied

Shutdown Input

A contact-closure input is provided for emergency shutdown of the unit. When this circuit is open, the unit shuts down with supply fan, exhaust fan turned off, and outside air dampers are closed. This state is maintained until the input is activated (contacts closed).

Contact Closed = Normal Operation
Contacts Open = Shutdown

Note that a jumper is installed at the factory between terminals 3 (24VAC) and terminal 4 (SD) of the low voltage terminal block CTB1. When a field shutdown input is used, the jumper must be removed and the external dry contact connected between terminal 3 and 4. The connection of an external power supply to these terminals will result in damage to the Unit Controller.

Smoke Purge Input

There are three field connection points for Smoke Purge operation, “Smoke Purge l,” “Smoke Purge 2,” and “Smoke Purge 3.” When a field supplied dry contact is closed between terminal 3 (24VAC) and terminal 6 (SMK1) the unit will initiate whatever smoke purge sequence has been programmed into the Unit Controller for Smoke Purge Sequence 1. When a field supplied dry contact is closed between terminal 3 (24VAC) and terminal 7 (SMK2) the unit will initiate whatever smoke purge sequence has been programmed into the Unit Controller for Smoke Purge Sequence 2. When a field supplied dry contact is closed between terminal 3 (24VAC) and terminal 8 (SMK3) the unit will initiate whatever smoke purge sequence has been programmed into the Unit Controller for Smoke Purge Sequence 3. Refer to *Smoke Purge on page 103* for additional programming information. The Smoke Purge operating state will be maintained until the contact is opened.

No external power source may be used when field wiring any of the above inputs. The 24 volt AC source on terminal 3 (24VAC) of the terminal block CTB1 must be used as the power source when field wiring these inputs, as shown in Figure 14 and 15. Failure to do so will result in improper unit operation and damage to the Unit Controller.

VAV Heat Relay Output

This is a field wired *OUTPUT* that is used to command the VAV boxes to full open during morning warm up operation. This 24VAC signal should have a maximum current draw not to exceed 20VA. If the VA requirement of the VAV boxes approaches 20VA, isolation relays should be field supplied and installed to avoid overloading the unit power supply.

Note that this signal is used to drive the VAV boxes open in morning warm up operations. Failure to drive the VAV boxes open during this mode of operation can cause unit shutdown and/or damage to the ductwork due to overpressurization.

The VAV Heat Relay Output cannot exceed a current draw of 20VA. If the power requirements of the VAV boxes exceed this amount, isolation relays must be field supplied and installed to prevent overloading the Unit Controller power supply.

The mixed air damper must be wired and installed into the system in the field. The wires to connect the actuator are located in the supply fan section, in the proximity of the actuator in the supply fan section floor, opposite the supply fan motor side. The plug assembly/ wires are attached with an elastic band and must be wired to the actuator, and the “plugs” mated together. Connect the wires to the motor as follows:

- Wire labeled “412” to terminal 1 in the actuator
- Wire labeled “303” to terminal 2 in the actuator
- Wire labeled “411” to terminal 5 in the actuator

BUILDING AUTOMATION SYSTEMS

The 120–150 ton rooftop unit ships ready for communication with any BAS utilizing the BACnet MS/TP protocol. The unit can also communicate with a BAS utilizing LON and N2 protocols with the addition of an E-Link gateway.

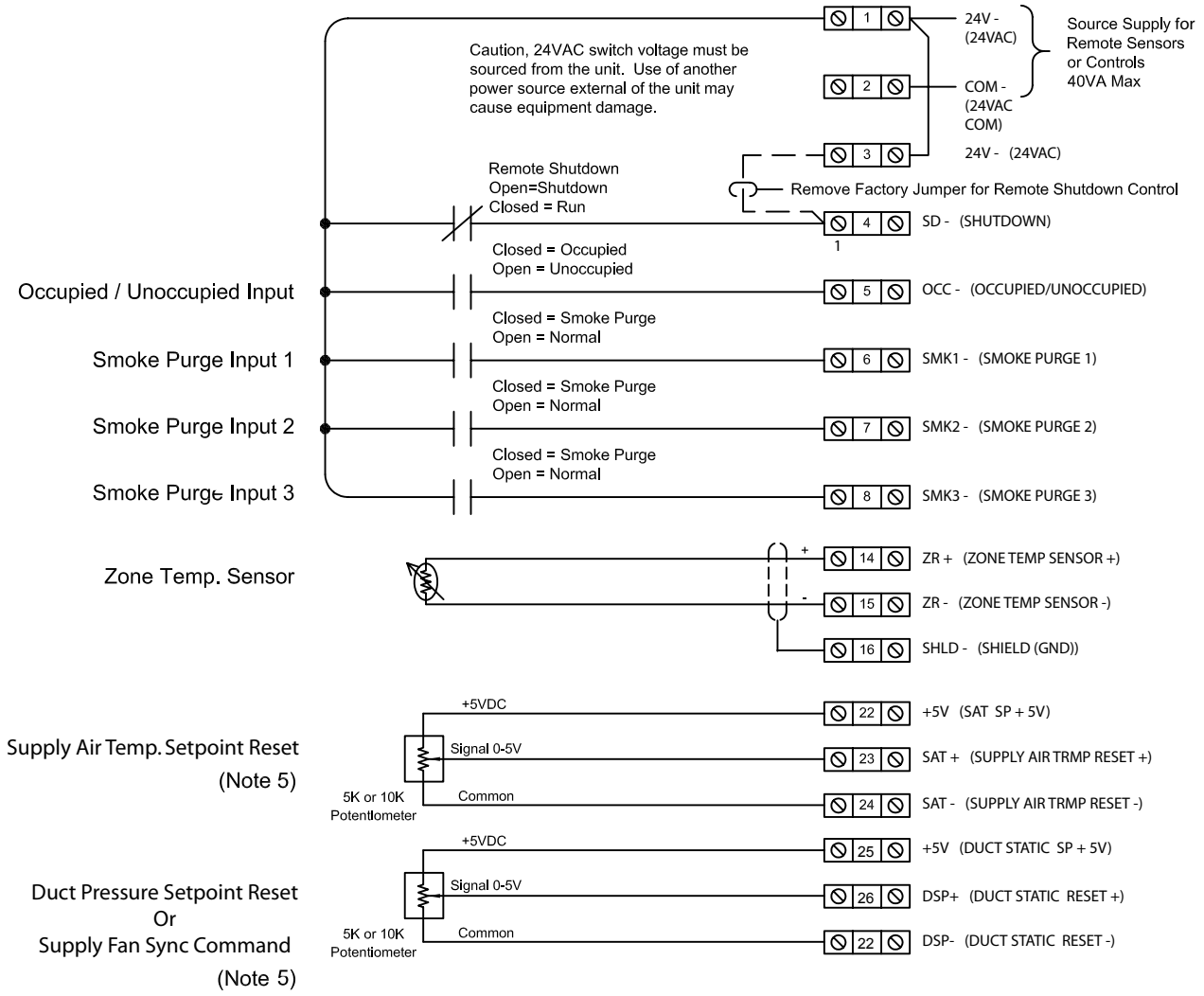
DIRTY FILTER SWITCH

On units with a dirty filter switch option, an adjustable differential pressure switch is installed to monitor the pressure drop across the filters. When the pressure drop across the filters exceeds the setting of the switch the switch closes sending a 24 volt signal to the Unit Controller. The Unit Controller posts a trouble fault in the service memory buffer; but will not shut down the unit.

ALARM CONTACTS

The Unit Controller has three sets dry Alarm Contacts that are closed during a fault. If the unit experiences a Supply Fan Fault, the Unit Controller will close a set of dry contacts between terminals 28 and 29 of the low voltage terminal block (CTB1). If the unit experiences a Cooling/Heating Fault, the Unit Controller will close a set of dry contacts between terminals 30 and 31 of the low voltage terminal block (CTB1). If the unit experiences a Sensor/Misc. Fault, the Unit Controller will close a set of dry contacts between terminals 32 and 33 of the low voltage terminal block (CTB1).

CTB1 FIELD CONTROL WIRING (INPUTS)



Wiring Notes

1. Wiring shown indicates typical wiring.
2. All wiring is Class 2, low voltage.
3. Maximum power available from the 24 VAC terminal is 40VA.
4. Use shielded wire where shown.
5. Potentiometer application shown. As an alternative, signal inputs can be driven from an analog output of a third party controller. Note: Input resistance is 15 K ohms.

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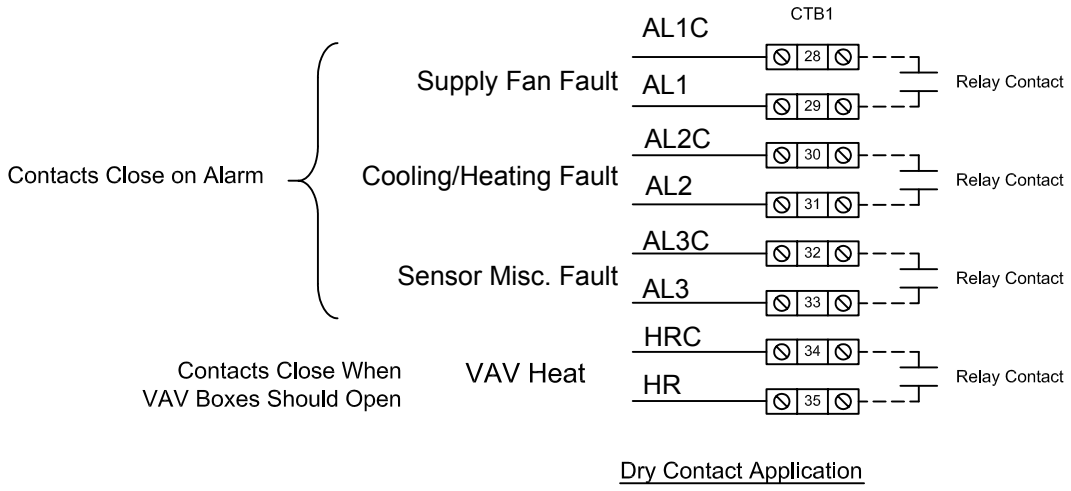
FIGURE 14 - FIELD CONTROL WIRING - INPUTS

CTB1 FIELD CONTROL WIRING (OUTPUTS)

Wirng Notes:

1. Wiring shown indicates typical wiring.
2. All wiring is Class 2, low voltage.
3. Maximum power available from the 24VAC terminal is 40VA.
4. Use shielded wire where shown.
5. Relay contacts suitable for pilot duty to 1A from 24VAC to 120VAC



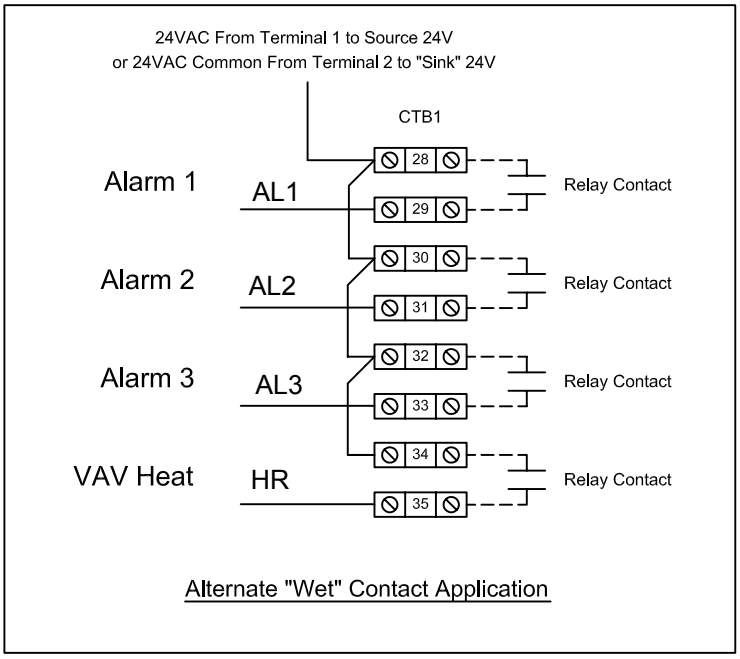


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FIGURE 15 - FIELD CONTROL WIRING - OUTPUTS

POWER WIRING

Field wiring to the unit must conform to provisions of National Electrical Code (NEC) ANSI / NFPA 70 latest edition and / or local ordinances. The unit must be electrically grounded in accordance with the NEC and / or local codes. Voltage tolerances, which must be maintained during starting and running conditions, are indicated on the unit data plate.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

Power supply to the unit must be NEC Class 1 and must comply with all applicable codes. A disconnect switch must be provided (factory option available). The switch must be separate from all other circuits. Wire entry at knockout openings requires conduit fittings to comply with NEC and/or Local Codes.

Refer to *Figure 16 on page 38* and *Figure 17 on page 39* for typical field provided and field installed line side power wiring connections.

Field power wiring connected to the incoming power termination point must be copper conductor only. Aluminum wire cannot be connected to the incoming power termination point.

ELECTRICAL SERVICE SIZING

In order to use the electrical service required for the cooling-only packaged rooftop unit, use the appropriate calculations listed below from U.L. 1995. Based on the operating mode and configuration of the rooftop, the calculations will yield different MCA (minimum circuit ampacity), and MOP (maximum overcurrent protection). **MCA and Overcurrent Protection Device Data is supplied on the unit data plate.** Also, refer to *Electrical Data on page 30.*

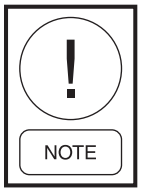
The following calculations apply to electrical data for the rooftop unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Minimum Circuit Ampacity (MCA) is based on 125% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-34.

The minimum recommended disconnect switch is based on 115% of the rated load amps for all loads included in the circuit, per N.E.C.

Maximum overcurrent protection is based upon 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-22. If the maximum overcurrent protection does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for maximum overcurrent protection is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

For dual point power connections, PTB1 in the power panel supplies the all unit compressors and condenser fans. PTB2 in the power panel supplies power to the unit supply, return and exhaust fans, and control circuitry.



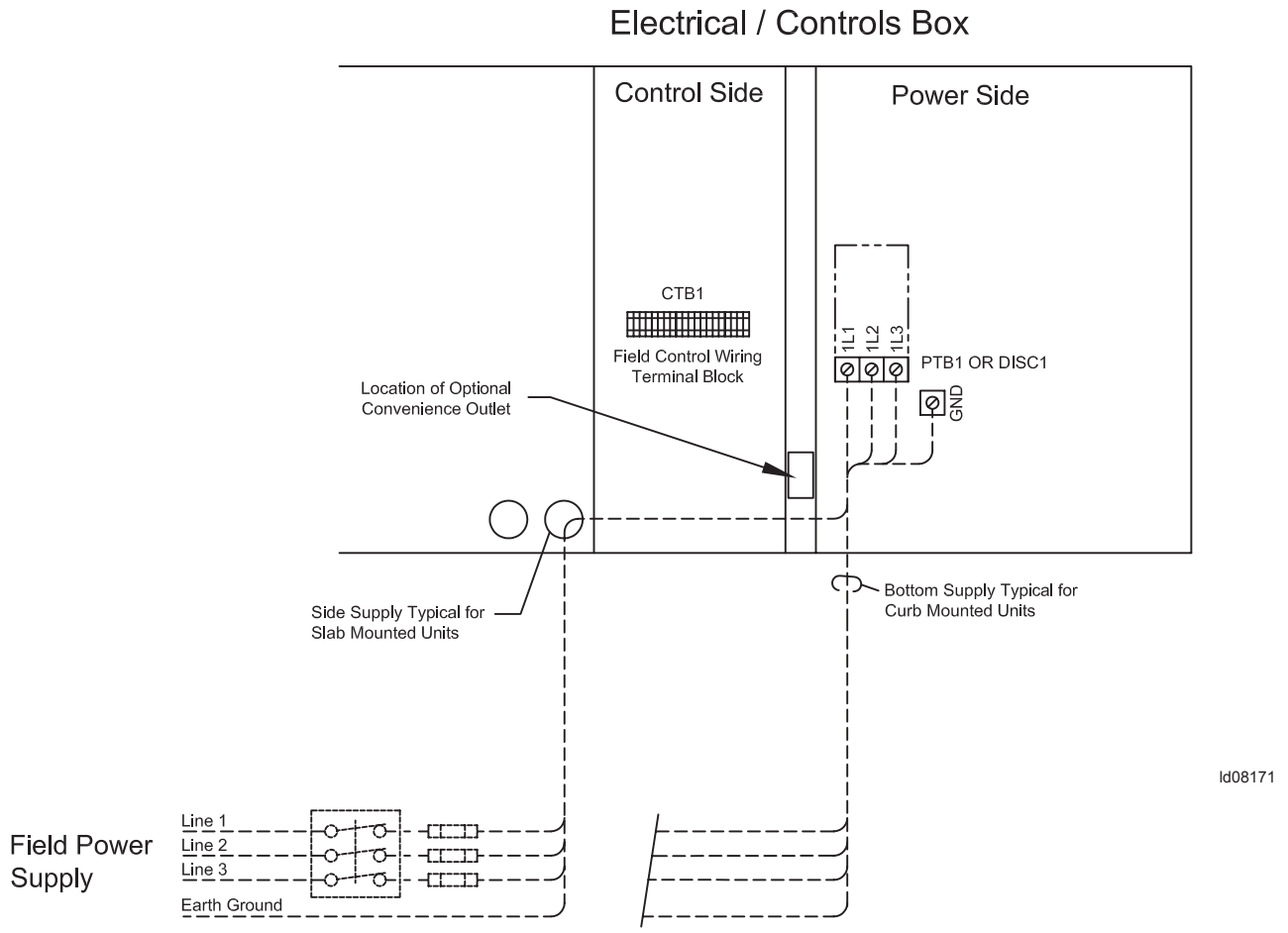
All wiring must conform to the National Electrical Code (NEC) and local codes that may be in addition to NEC.

TABLE 10 - THREE PHASE POWER SUPPLY CONDUCTOR SIZE RANGE *

130 Ton Unit				
Supply Voltage	**Single Point TB**	**Single Point Disconnect**	**Dual Point TB TB 1**	**TB 2**
460V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0
575V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0

The actual size of the conductor will depend on the total ampacity of the unit and length of the conductor run. The above table gives the conductor size range for the terminal block lugs in the unit.

UNIT POWER SUPPLY WIRING, STANDARD SINGLE POINT, W/ OR W/O DISCONNECT

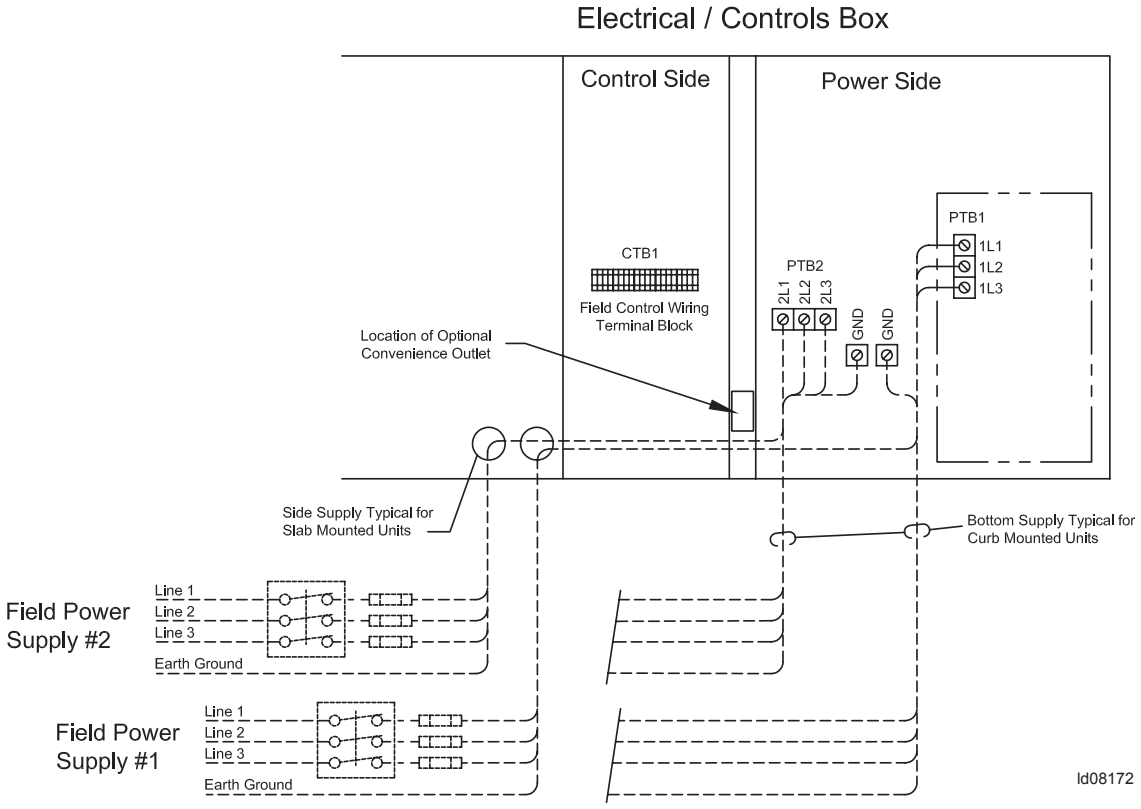


NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Consult the IOM manual or unit nameplate data to determine Minimum Circuit Ampacities (MCA) and recommended Dual Element fuse sizes.
4. Minimum Circuit Ampacity (MCA) is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440.34).
5. Maximum Dual Element Fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440.22)
6. A (2) preceding the wire range indicates the number of termination points available per phase of the wire range specified. Actual wire size and number of wires per phase must be determined based on N.E.C.
7. Use copper conductors only.
8. On units with an optional disconnect switch, the supplied disconnect switch is a “Disconnecting Means” as defined in the N.E.C. Section 100, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect switch is not intended to be a Load Break Device.

FIGURE 16 - SINGLE-POINT POWER SUPPLY WIRING

UNIT POWER SUPPLY WIRING, OPTIONAL DUAL POINT



NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Consult the IOM manual or unit nameplate data to determine Minimum Circuit Ampacities (MCA) and recommended Dual Element fuse sizes.
4. Minimum Circuit Ampacity (MCA) is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440.34).
5. Maximum Dual Element Fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440.22)
6. A (2) preceding the wire range indicates the number of termination points available per phase of the wire range specified. Actual wire size and number of wires per phase must be determined based on N.E.C.
7. Use copper conductors only.
8. On units with an optional disconnect switch, the supplied disconnect switch is a “Disconnecting Means” as defined in the N.E.C. Section 100, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect switch is not intended to be a Load Break Device.

FIGURE 17 - DUAL-POINT POWER SUPPLY WIRING WITH NON-FUSED DISCONNECT

TRANSDUCER PNEUMATIC TUBING

Static Pressure Control Plastic Tubing

(Pneumatic Tubing)

Duct static transducers (all VAV units) and any unit with an optional building pressure control transducer, require pneumatic tubing to be field supplied and installed. The *"High"* side of the respective transducer must be routed to the location in the building or ductwork where a constant pressure is desired. Both the duct static transducer (VAV only) and optional building pressure transducer are mounted in the unit control box. All wiring from the transducers is factory installed.

Duct Static Transducer

Plastic tubing (1/4" ID) must be run from the high pressure tap of the transducer to a static pressure tap (field supplied) in the supply duct, located at a point where constant pressure is desired. This is normally 2/3rds of the way down the duct, before the first takeoff..

Building Pressure Transducer

Plastic tubing (1/4" ID) must be run from the high pressure tap of the building static pressure transducer to a static pressure tap (field supplied), located in the conditioned space. The tap should be placed in a location where over pressurization will cause a problem, for example, in the lobby area where excessive pressure will cause the doors to remain open. The tap should never be placed above the ceiling.

This will allow for standard building pressure control through the Unit Controller. There is an option to control the VFD Driven Exhaust Fan speed through the BAS, if desired. If the unit has a return fan, the same point can be used to control the Modulating Exhaust Damper. The point for BAS control can be enabled in the Service key.

Static Pressure Probe Installation

On units with duct static transducers (VAV units) and any unit with an optional building pressure, a factory supplied Static Pressure Probe must be field installed at the vertical post by the control compartment.

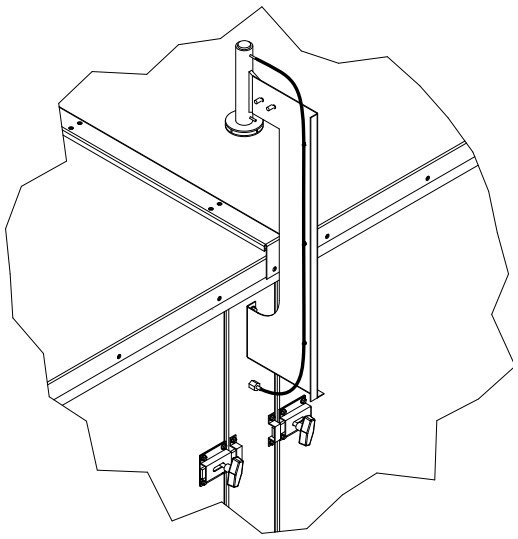


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FIGURE 18 - STATIC PRESSURE PROBE INSTALLATION

The factory supplied atmospheric pressure probe and associated mounting hardware are shipped inside the unit control panel. The hardware consists of a mounting bracket and a short section of pneumatic tubing. *The pneumatic tubing must be field installed from a factory pressure tap (next to the mounting location for the static pressure probe) to the atmospheric pressure probe (see Static Pressure Probe Installation Instructions, Form YRK-N1).*

If the unit is equipped with both a building pressure transducer and a duct static transducer, a "tee" will be factory installed, and both the duct static pressure transducer and building pressure will be connected to the "tee" - both building static pressure transducer and duct static transducer will use the same factory supplied atmospheric pressure probe.

NOTE

The "low" side connection of the duct static or building pressure transducers are shipped with the pneumatic tubing factory installed and routed, to the external factory pressure tap.

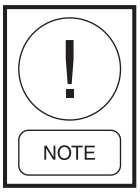
ROOF CURB INSTALLATION

General Information

When ordered, the roof curb is shipped knocked-down in a separate container and needs to be field assembled and installed. Refer to Installation Manual that is shipped with the roof curb for specific instructions.

On full perimeter roof curb the opening in the roof should not extend under the condenser section of the curb. The condenser section of the roof curb is not insulated and could result in condensation build up under the condenser section as well as higher than normal sound levels in the conditioned space.

The roof curb drawings contained in the YORK literature are not intended as construction documents for the field fabrication of a roof curb. YORK will not be responsible for the unit fit up, leak integrity, or sound level with field fabricated roof curbs.



Wood or fiber cant strips, roofing felts, roofing material, caulking and curb-to-roof fasteners are to be field supplied.

DUCT SYSTEM

Duct Connection Guidelines

All intake and discharge air duct connection to the unit may be made directly to the unit. These air duct connections should be on flexible material and should be installed so they are sufficiently loose. Duct runs and transitions must be made carefully to hold friction loss to a minimum. Avoid short turns, and duct elbows should contain splitters or turning vanes.

Ductwork connected to the supply discharge should run in a straight line for at least two equivalent outlet diameters. Never deadhead the discharge into the flat surface of a plenum.

Installation of elbows, discharge damper and other abrupt flow area changes installed directly at the fan outlet will cause system losses. These losses must be taken into account during the design phase and must be added to any field measurements.

SOUND AND VIBRATION TRANSMISSION

All roof mounted air handling units generate some sound and vibration that may or may not require some special treatment of the air conditioned space. The noise generated by the air handling unit is dependent on the speed of the fan, the amount of air the fan is moving, the fan type and the static efficiency of the fan. In applications where sound and vibration transmissions may be objectionable, good acoustical engineering practices must be incorporated in the system design.

GAS HEATING

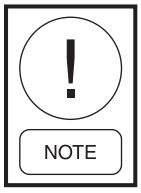
Gas Piping

Proper sizing of the gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the total length of the gas pipe run. The latest edition of the National Fuel Gas Code, NFPA 54 ANSI Z223.1, should be followed in all cases unless superseded by local codes and/or gas company requirements. Refer to *Table 11 on page 41*.

TABLE 11 - PIPE SIZES

LENGTH IN FEET	NOMINAL IRON PIPE SIZE	
	1-1/2 IN.[1]	2 IN.[1]
10	1,600	3,050
20	1,100	2,100
30	890	1,650
40	760	1,450
50		1,270
60		1,150
70		1,050
80		990

[1] Maximum capacity of pipe in cubic feet of gas per hour (based upon a pressure drop of 0.3 inch water column and 0.6 specific gravity gas).



There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 1-1/2-inch pipe connection at the entrance fitting. Line size should not be sized smaller than the entrance fitting size.

Gas Connection

The gas supply piping should be routed to an appropriate location for entrance into the unit. The installing contractor will be responsible for providing the unit penetration, connection to the factory installed gas manifold, and water tight sealing of the gas piping penetration. Please refer to the latest edition of the National Fuel Gas Code, NFPA 54 ANSI Z223.1, local gas codes or gas company requirements for the proper installation of pressure regulators, shut-off valves and drip legs. Please refer to *Figure 9 on page 27*, for typical gas piping locations.

Gas Piping Recommendations

A drip leg and a ground joint union must be installed in the gas piping.

When required by local codes, a manual shut-off valve will have to be installed outside of the unit.

Use wrought iron or steel pipe for all gas lines. Pipe dope should be applied sparingly to male threads only.

Natural gas may contain some propane. Propane being an excellent solvent will quickly dissolve white lead or most standard commercial compounds. Therefore, a special pipe dope must be applied when wrought iron or steel pipe is used. Shellac base components such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clyde's or John Crane may be used.

All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out the loose particles. Before initial start-up, be sure that all of the gas lines external to the unit have been purged of air.

The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under "Limitations" listed in the beginning of this section. After the gas connections have been completed, open the main shutoff valve admitting gas pressure to the mains. Check all joints for leaks with soap solution or other material suitable for the purpose. **NEVER USE A FLAME!**

The furnace and its individual manual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 0.5 psig.

Disconnect gas piping from unit when leak testing at pressures greater than 0.5 psig. Pressures greater than 0.5 psig will cause gas valve damage resulting in a hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it must be replaced.

A 1/8 inch N.P.T plugged tapping, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the furnace.

Combustion Vent

The combustion vent assembly is shipped in the return air section of the unit. The combustion vent assembly must be mounted over the flue gas outlet fixed panel located to the right of the gas heat access door. Install as follows:

1. Remove the combustion vent assembly from the return compartment.
2. Remove the vertical row of six screws on either side of the flue gas outlet fixed panel.
3. Mount the combustion vent assembly over the flue gas outlets and attach to the gas outlet fixed panel using the screws removed in step 2.
4. See *Figure 19 on page 42* for the proper orientation of the combustion vent. The internal baffle(s) must direct the flue gases upward.

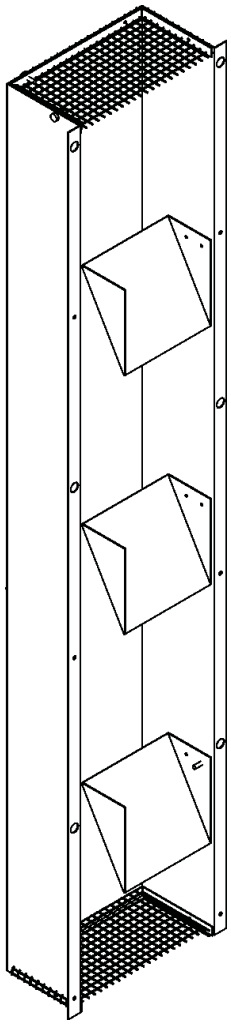


FIGURE 19 - COMBUSTION VENT

SECTION 3–START-UP

To protect warranty, this equipment must be installed and serviced by an authorized YORK® service mechanic or a qualified service person experienced in air handling and condenser unit installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as HP cut-out settings, design working pressures and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panel. Before servicing, open and tag all disconnect switches.

Reference YORK 50–150 Ton Rooftop Unit Start-Up Guide (Form YRK-SU1) for additional information.

CRANKCASE HEATERS

With power applied to the rooftop unit, the crankcase heater for each compressor will be ON whenever the compressor is not running. The heater is interlocked into the compressor motor contactor and is not controlled by the microprocessor.

The purpose of the crankcase heater is to prevent the migration of refrigerant to the crankcase during shutdown, assuring proper lubrication of the compressor on start-up.

Anytime power is removed from the unit for more than an hour, the crankcase heater should be left ON for 24 hours prior to start.

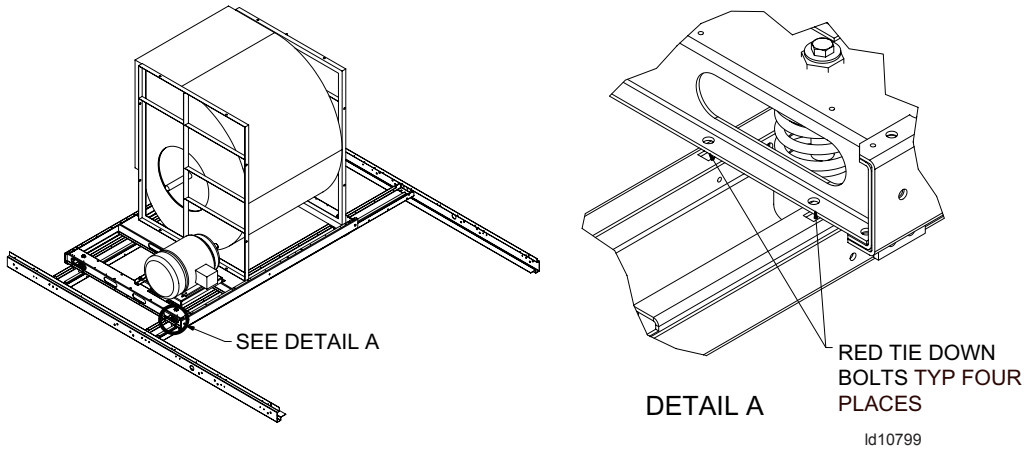
Power must be applied to the rooftop unit 24 hours prior to starting the unit compressors. Failure to observe this requirement can lead to compressor damage and voiding of the compressor warranty.

CHECKING THE SYSTEM PRIOR TO INITIAL START (NO POWER)

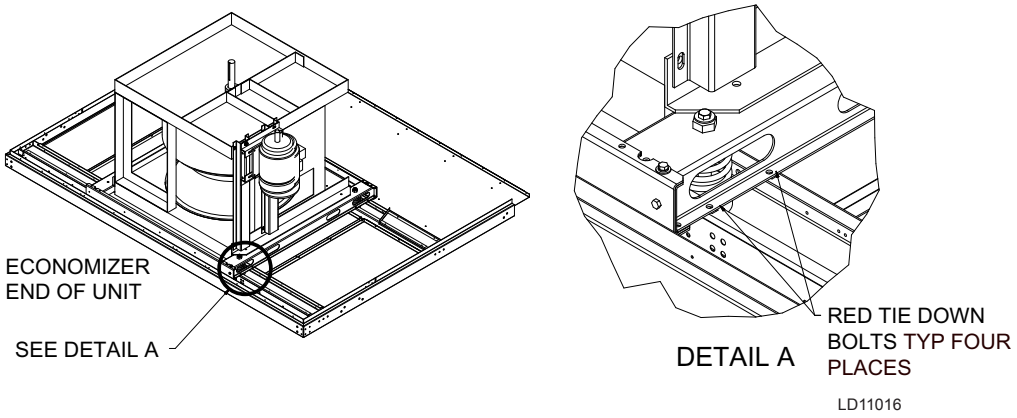
Unit Checks

1. Inspect the unit for shipping or installation damage.
2. Visually check for refrigerant piping leaks.
3. The compressor oil level should be maintained so that an oil level is visible in the sight glass. The oil level can only be tested when the compressor is running in stabilized conditions, guaranteeing that there is no liquid refrigerant in the lower shell of the compressor. In this case, the oil must be between 1/4 and 3/4 in the sight glass. At shutdown, the oil level can fall to the bottom limit of the oil sight glass.
4. Check the control panel to assure it is free of foreign material (wires, metal chips, etc.).
5. Visually inspect field wiring (power and control). Wiring MUST meet N.E.C. and local codes.
6. Check tightness of terminal lugs inside the power panel on both sides of the contactors, overloads, fuses, and power connections.
7. Verify fuse sizing in main circuits.
8. Verify field wiring for thermostat (if applicable), optional zone sensor, etc.
9. Verify all applicable pneumatic tubing has been field installed for duct static pressure transducers (VAV units), optional building pressure transducer for power exhaust option, and outdoor static pressure prove.
10. Supply, exhaust, and return fan isolator spring bolts removed *(refer to Figure 20 on page 44)*.

The supply, exhaust and return fans have tie down bolts installed at the factory to prevent movement in the fan assemblies during shipment. THESE HOLD DOWN BOLTS MUST BE REMOVED PRIOR TO OPERATION OF THE ABOVE FANS. There are eight bolts per assembly two at each comer of the fan skids, front and rear. The bolt locations are shown in Figure 19. The bolt heads are red in color and a label identifies their location in the unit.



SUPPLY & EXHAUST FAN ASSEMBLIES



RETURN FAN ASSEMBLY

FIGURE 20 - FAN ISOLATOR SPRING BOLTS (TOTAL OF 8)

11. Verify proper bearing and locking collar torque values on supply and exhaust fans (refer to *SECTION 4–MAINTENANCE*).
12. Verify proper drive alignment of supply and exhaust fans (refer to *SECTION 4–MAINTENANCE*).
13. Verify proper belt tension of supply fan, exhaust fan or return fan (refer to *SECTION 4–MAINTENANCE*). Belts must be checked after 24 hours of initial operation.
14. Manually rotate condenser fan blades, supply exhaust and return blower wheels and motors, to assure freedom of movement.
15. Verify proper condensate drain trap installation (refer to *Figure 20 on page 44*). Fill traps with water prior to unit start-up.
16. If applicable, verify installation of air filters (refer to *SECTION 2–INSTALLATION* for size and quantity).
17. Verify the Variable Frequency Drive setpoints for VAV units and optional Variable Frequency Drive Exhaust or Return Fans. The Variable Frequency Drive for the Supply Fan is in the supply fan blower compartment. The Variable Frequency Drive for the Exhaust or Return Fan is located in the return air compartment.
18. If equipped, open suction line ball valve, discharge line ball valve, and liquid line ball valve for each refrigerant system.
19. An installation checklist MUST be provided to the YORK start-up technician. Please ensure that all applicable boxes are checked, and that all appli-

cable options, programs, and setpoints are provided. The YORK technician has the ability to deny start-up of the unit for any item that is checked off, but not complete. Any option, program, or setpoint that is applicable but not provided will be left at the factory default.

UNIT CHECKS–POWER APPLIED

1. Apply 3-phase power and verify its value. Voltage imbalance should be no more than 2% of the average voltage.
2. Verify programmed units' setpoints (refer to *YORK 50–150 Ton Rooftop Unit Start-Up Guide (Form YRK-SU1)*).
3. Verify correct fan rotation (fan should rotate in direction of arrow on fan housing).
4. Insure proper compressor rotation (see following instruction on *Verifying Compressor Rotation on page 45*).

Verifying Compressor Rotation

This unit uses scroll compressors, which will only operate in one direction. Failure to observe these steps could lead to compressor failure.

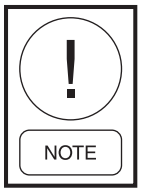
The packaged rooftop unit uses hermetic scroll compressors, which only pump in one direction. Therefore, it is necessary to verify proper rotation at unit start-up. Operation of the compressor in the reverse direction will not produce any capacity, and cause the compressor to cycle on internal overload. Operating the compressor in reverse for longer than 60 seconds can result in failure of the compressor.

To verify proper rotation, monitor the suction and discharge pressures of the respective refrigerant circuit while the compressor cycles ON. If the discharge pressure increases and suction pressure decreases as the compressor cycles ON, the compressor is properly phased and operating in the correct rotation.

Suction and discharge pressure may be monitored with the User Interface display if the optional suction and discharge pressure transducers are installed. If the optional transducers are not installed, pressures must be monitored with a manifold gauge connected to the service valves located on the suction and discharge lines.

Compressor Oil Level Check

The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running in stabilized conditions, the oil level must be between 1/2 and 3/4 in the oil sight glass.



At shutdown, the oil level can fall to the bottom limit of the oil sight glass

INITIAL START-UP

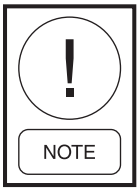
After all of the preceding checks have been completed and the control panel has been programmed as required, the unit may be placed into operation by performing the following:

1. Place the Unit Switch in the control panel to the ON position.
2. With a demand, the supply fan will cycle ON, and permit compressor operation if the air proving pressure switch for the supply fan has closed.
3. The first compressor will start. After several minutes of operation, a flow of refrigerant will be noted in the sight glass, the vapor in the sight glass will clear, and there should be a solid column of liquid visible in the sightglass when the TXV stabilizes.
4. Allow the compressor to run at least 10 minutes, being ready to stop it immediately if any unusual noise or adverse conditions develop.
5. Check the system operating parameters by checking evaporator superheat and condensing subcooling. Connect a gauge manifold set to the Schrader service valve connections on the liquid and common suction line in the condensing section of the unit. After the system is running and the pressures have stabilized, measure the temperature at the liquid and common suction lines near the Schrader service valves. Calculate evaporator superheat and condensing subcooling. Both should be approximately 15°. Refer to *Checking Superheat and Subcooling on page 46* for information on how to calculate evaporator superheat and condenser subcooling. Repeat the above process for each of the refrigerant systems.

6. With an ammeter, verify that each phase of the condenser fans, compressors, supply fan, and exhaust fan are within the RLA/FLA as listed on the unit data plate.

Refrigerant Charge

This rooftop unit comes fully charged from the factory with refrigerant R-410A as standard. Because the components of R-410A evaporate (or condense) at different rates, the blend's composition constantly changes between bubble point and dew point. Because of this, only liquid refrigerant should be used when adding charge to the unit. The only exception would be if the entire contents of a refrigerant cylinder were added at one time.



Always charge with liquid when adding R-410A refrigerant. Failure to do so will compromise the properties of the refrigerant being added to the rooftop unit, and result in substandard performance of the unit.

Checking Superheat and Subcooling

R-410A temperature charts list the associated saturation temperature in one column, with the associated pressure in another column.

Subcooling (R-410A)

When the refrigerant charge is correct, there will be no vapor in the liquid sight glass with the system operating under full load conditions.

The subcooling temperature of each system can be calculated by recording the temperature of the liquid line at the outlet of the condenser and subtracting it from the saturation temperature listed in *Table 12 on page 47*, for the corresponding discharge pressure. If the rooftop unit does not have an access port for liquid access, subtract the condenser coil pressure drop value from the table on this page, from the discharge pressure to determine the equivalent saturation temperature.

Example:

When the discharge pressure is 388 PSIG and the liquid temperature is 95.0°F.

Liquid Pressure = Discharge Pressure (388 PSIG) - 33.0 PSIG.

Saturation Temperature for 355 PSIG	= 108.0°F
Minus the liquid line temp	= 95.0°F
Liquid Line Subcooling of	= 13.0°F

The subcooling should be 15°F at design conditions.

Superheat (R-410A)

The superheat should be checked only after steady state operation of the unit has been established, the discharge air temperature has been pulled down to within the control range, and the unit is running in a fully loaded condition.

The superheat is calculated as the difference between the actual temperature of the refrigerant gas in the suction line and the temperature corresponding to the Suction Pressure as shown in *Table 12 on page 47*.

Example:

The suction pressure is 130 PSIG and the suction line temperature is 57.0°F.

Suction Line Temperature	= 57.0°F
Saturation Temperature for 130 PSIG	= 45.0°F
Evaporator Superheat	= 12.0°F

When adjusting the expansion valve, the adjusting screw should be turned not more than one turn at a time, allowing sufficient time (approximately 15 minutes) between adjustments for the system and the thermal expansion valve to respond and stabilize.

The superheat setting should be adjusted to 12.0°F at design conditions.

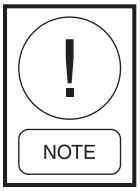
Leak Checking

Leak check compressors, fittings and piping to assure no leaks. Verify the evaporator distributor tubes do not have bare copper touching each other or are against a sheet metal edge. If you are leak checking a unit charged with R-410A make sure the leak test device is capable of sensing refrigerant R-410A.

TABLE 12 - R-410A PRESSURE / TEMPERATURE CHART

PSIG	TEMP ˚F	PSIG	TEMP ˚F
0	-60	78	20
2	-58	80	21
4	-54	85	24
6	-50	90	26
8	-46	95	29
10	-42	100	32
12	-39	105	34
14	-36	110	36
16	-33	115	39
18	-30	120	41
20	-28	125	43
22	-26	130	45
24	-24	135	47
26	-20	140	49
28	-18	145	51
30	-16	150	53
32	-14	160	57
34	-12	170	60
36	-10	180	64
38	-8	190	67
40	-6	200	70
42	-4	210	73
44	-3	220	76
46	-2	225	78
48	0	235	80
50	1	245	83
52	3	255	85
54	4	265	88
56	6	275	90
58	7	285	92
60	8	295	95
62	10	305	97
64	11	325	101
66	13	355	108
68	14	375	112
70	15	405	118
72	16	500	134
74	17	600	149
76	19	700	159

GAS HEAT MODELS



Installation of this furnace at altitudes above 2000 ft (610 m) shall be made in accordance with the High Altitude Accessory Kit Installation Instructions (YRK-N2) available with this furnace.

L'installation de ce générateur de chaleur à des altitudes supérieures à 610 m (2000 pi) doit être effectuée conformément aux instructions d'installation du kit d'accessoires de haute altitude (YRK-N2) fournie avec cet appareil.

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death, or property damage.

Improper servicing could result in dangerous operation, serious injury, death, or property damage.

- ***Before servicing, disconnect all electrical power to furnace.***
- ***When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.***
- ***Verify proper operation after servicing.***

RISQUE D'ÉLECTROCUTION, D'INCENDIE OU D'EXPLOSION

Si les consignes de sécurité ne sont pas suivies à la lettre, cela peut entraîner la mort, de graves blessures, un fonctionnement dangereux ou des dommages matériels.

Un entretien inadéquat peut entraîner la mort, de graves blessures, un fonctionnement dangereux ou des dommages matériels.

- ***Avant de faire l'entretien de l'appareil de chauffage, le débrancher de l'alimentation électrique.***
- ***Avant l'entretien des commandes, étiqueter tous les fils avant de les déconnecter. Rebrancher correctement les fils.***
- ***Vérifier que l'appareil fonctionne correctement aprés l'entretien.***

FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury, death, or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- ***Do not try to light any appliance.***
- ***Do no touch any electrical switch; do not use any phone in your building.***
- ***Leave the building immediately.***
- ***Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.***
- ***If you cannot reach your gas supplier, call the fire department.***

Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

RISQUE D'INCENDIE OU D'EXPLOSION

Si les consignes de sécurité ne sont pas suivies à la lettre, cela peut entraîner la mort, de graves blessures ou des dommages matériels.

Ne pas entreposer ni utiliser d'essence ni autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI UNE ODEUR DE GAZ EST DÉTECTÉE

- ***Ne mettre en marche aucun appareil.***
- ***Ne toucher aucun interrupteur électrique; ne pas utiliser de téléphone dans le bâtiment.***
- ***Quitter le bâtiment immédiatement.***
- ***Appeler immédiatement le fournisseur de gaz en utilisant te téléphone d'un voisin. Suivre les instructions du fournisseur de gaz.***
- ***Si le fournisseur de gaz n'est pas accessible, appeler le service d'incendie.***

L'installation et l'entretien doivent être effectués par un installateur ou une entreprise d'entretien qualifié, ou le fournisseur de gaz.

FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury, death, or property damage.

Never test for gas leaks with an open flame.

Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

RISQUE D'INCENDIE OU D'EXPLOSION

Si les consignes de sécurité ne sont pas suivies à la lettre, cela peut entraîner la mort, de graves blessures ou des dommages matériels.

Ne jamais vérifier la présence de fuites de gaz au moyen d'une flamme nue.

Vérifier tous les raccords en utilisant une solution savonneuse commerciale conçue spécialement pour la détection de fuites. Un incendie ou une explosion risque de se produire, ce qui peut entraîner la mort, des blessures ou des dommages matériels.

Pre-Start Checks

Start-up of gas heat includes verification of incoming gas line pressure and leak checks in the field installed gas lines, these items are the responsibility of the installing contractor; however, they should also be verified prior to unit start-up. Correct values and the proper procedures are described later in this section.

Verify wiring inside the burner compartment to insure the wiring/terminals are tight and securely connected to the components, such as the ignition control, flame sensor, gas valve, rollout switches and igniter.

The gas heat start up sequence begins with a 30 second prepurge. The next step in the sequence is the closure of the air proving switch. The heat section has a combustion air-proving switch. This switch must close before the ignition sequence can initiate. If the air-proving switch is closed after the 30 second prepurge the ignition control will energize the spark igniter and open the gas valve.

The furnace ignition control uses flame rectification as verification of burner operation. The minimum allowable flame current for operation is 0.7 DC microamps.

If the furnace ignition control does not prove flame in 7 seconds, it will turn off the spark signal and close the gas valve. It will wait 30 seconds and then initiate a second ignition sequence. If flame is not proven during the second 7 second trial for ignition the control will turn off the spark signal, close the gas valve, wait 30 seconds and initiate a third ignition sequence. If flame rectification is not proven on the third try, the ignition control will lock out.

The heat section has two roll out switches mounted above the burners. The purpose of the roll out switch is to protect the gas heat section from flame roll out, flame burning outside the heat exchanger. A restriction in the heat exchanger or breach in the flue passages could result in a roll out situation. The roll out switch is a manual reset device.

The unit has two high temperature limit switches. One located at the heat exchanger vestibule panel and the other located in the area of the heat exchanger return bend. These limits are automatic reset devices. If the limit opens the ignition control will deenergize the gas valve. As soon as the limit closes the ignition control will reinitiate the ignition sequence.

The control circuit is tested in the factory to insure that all of these steps are followed, however, natural gas is not actually introduced to the system in the plant; nitrogen is used in its place.

Post Start Checks

When a signal is received at the gas heat control module from the Unit Controller, verify:

- Combustion blower starts and runs for 30 seconds before the spark is initiated.
- Spark igniter sparks.
- Gas valve opens.
- Burners light from right to left, in a 2.5 second time frame.
- Each burner lights in sequential order from right to left; and establishes stable flame immediately upon ignition.
- No gas leaks in the unit piping as well as the supply piping.

- Correct manifold gas pressures. See *Manifold Gas Pressure Adjustment on page 50*
- The supply pressure is adequate. It must be within the limitations shown in *Table 13 on page 50*.

NOTE

Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas pressure exceed 10.5 iwg, nor the operating pressure drop below 4.5 iwg for natural gas or the standby gas pressure exceed 13.0 iwg, nor the operating pressure drop below 11.0 iwg for propane. If the gas pressure is outside these limits, contact the installing mechanical contractor for corrective action.

- The flame is stable, with the flame present only at the end of the burner and that there isn't any burning occurring inside the burner.

NOTE

There should be a little yellow tipping of the flame.

NOTE

There may be some smoke through the flue, due to tooling oil burning off of the heat exchanger tubing.

TABLE 13 - LOW FIRE / HIGH FIRE - STAGED

TYPE OF GAS	LINE PRESSURE		MANIFOLD PRESSURE	
	MINIMUM	MAXIMUM	LOW FIRE +/- 0.3 IWG	HIGH FIRE +/- 0.3 IWG
NATURAL	4.5 IWG	10.5 IWG	1.4 IWG	3.5 IWG
PROPANE	11.0 IWG	13.0 IWG	4.2 IWG	10.0 IWG

TABLE 14 - LOW FIRE / HIGH FIRE MODULATING

TYPE OF GAS	LINE PRESSURE		PRESSURE TO MAXITROL VALVE	
	MINIMUM	MAXIMUM	LOW FIRE +/- 0.3 IWG	HIGH FIRE +/- 0.3 IWG
NATURAL	4.5 IWG	10.5 IWG	1.4 IWG	3.5 IWG
PROPANE	11.0 IWG	13.0 IWG	4.2 IWG	10.0 IWG

TABLE 15 - LOW FIRE (INDUCER FAN ON LOW, 1.4 IWG INPUT TO MAXITROL VALVE

INPUT VOLTAGE TO SIGNAL CONDITIONER (VDC)	MANIFOLD PRESSURE (IWG)
0.0	0.22
0.5	0.22
1.0	0.22
1.5	0.22
2.0	0.22
2.5	0.32
3.0	0.45
3.5	0.66
4.0	0.84
4.5	1.05
5.0	1.25
5.5	1.30
6.0	1.30
6.5	1.30

TABLE 16 - HIGH FIRE (INDUCER FAN ON HIGH, 3.5 IWG INPUT TO MAXITROL VALVE

INPUT VOLTAGE TO SIGNAL CONDITIONER (VDC)	MANIFOLD PRESSURE (IWG)
4.0	1.10
4.5	1.40
5.0	1.70
5.5	2.10
6.0	2.50
6.5	2.90
7.0	3.15
7.5	3.25
8.0	3.30
8.5	3.30
9.0	3.30

Manifold Pressure–Modulating Gas

Manifold Gas Pressure Adjustment

Small adjustments to the manifold gas pressure can be made by following the procedure outlined below. Refer to *Figure 21 on page 51* for the high and low fire pressure regulator adjustment locations.

1. Turn the gas off to the unit.
2. Use a 3/16 inch Allen wrench to remove the 1/8 inch NPT plug from the outlet pressure tap of the valve.
3. Install a brass adapter to allow the connection of a hose to the outlet pressure tap of the valve.
4. Connect the hose to a manometer capable of reading the required manifold pressure value.

5. Turn the gas back ON.
6. Place the heat section into high fire operation.
7. Compare the high fire manifold pressure to *Table 13 on page 50.*
8. To adjust the high fire manifold pressure remove the cap from the high fire pressure regulator. Use a 3/32 inch Allen wrench to make the manifold pressure adjustment. To increase the manifold pressure, turn the screw clockwise; to decrease the manifold pressure, turn the screw counter-clockwise. Place your finger over the adjustment opening while verifying the manifold pressure.

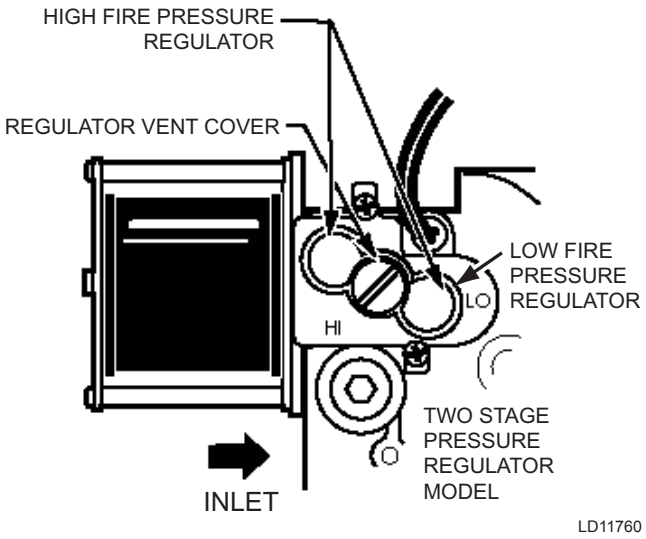


FIGURE 21 - MANIFOLD GAS PRESSURE ADJUSTMENT

9. Place the heat section into low fire operation.
10. Compare the low fire manifold pressure to *Table 13 on page 50.*
11. To adjust the low fire manifold pressure remove the cap from the low fire pressure regulator. Use a 3/32 inch Allen wrench to make the manifold pressure adjustment. To increase the manifold pressure, turn the screw clockwise; to decrease the manifold pressure, turn the screw counter-clockwise. Place your finger over the adjustment opening while verifying the manifold pressure.
12. Turn the heat OFF.
13. Turn the gas OFF.
14. Remove the brass tubing adapter and replace the plug in the outlet pressure tap.

3

TABLE 17 - GAS HEAT PERFORMANCE DATA

UNIT	GAS INPUT CAPACITY (BTU/HR X 1000)	MAXIMUM OUTPUT CAPACITY (BTU/HR X 1000)	AIRFLOW		TEMP. RISE
			MIN.	MAX.	
ALL UNITS	Burner 1	300	6,950	27,750	10-40
	Burner 2	600	11,150	27,750	20-50
	Burner 3	900	15,150	33,325	25-55

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SECTION 4–MAINTENANCE

Make sure power is removed from the unit before performing the maintenance items contained in this section.

GENERAL

A regularly scheduled preventive maintenance program will help to ensure the proper operation of the unit as well as possibly prevent extended periods of downtime due to component failure. It is the responsibility of the owner to ensure that proper maintenance is being performed on the unit. Failure to provide the proper preventive maintenance could result in the warranty being voided.

PERIODIC MAINTENANCE–MONTHLY

Filters

Check the cleanliness of the filters and replace or clean as required.

Linkages

Examine the damper and operator linkages to insure that each is free and operating smoothly.

Compressors

Oil Level Check–The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running in stabilized conditions, the oil level must be between 1/4 and 3/4 in the oil sight glass. *Note: at shutdown, the oil level can fall to the bottom limit of the oil sight glass.*

Oil Analysis–Use YORK Type "V" POE oil (clear) for units charged with R-410A refrigerant. The type of refrigerant and amount per system is listed on the unit rating plate. A change in the oil color or odor may be an indication of contaminates in the refrigeration system. If this occurs, an oil sample should be taken and analyzed. If contaminations are present, the system must be cleaned to prevent compressor failure. This can be accomplished through the installation of oversized suction and liquid line driers. The driers may have to be changed several times to clean up the system depending on the degree of contamination.

Never use the scroll compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor, which will result in failure of compressor.

Fan Bearing Lubrication

Add grease slowly with shaft rotating until a slight bead forms at the seals. If necessary, re-lubricate while bearing is stationary. The fan data plate (attached to the fan scroll) lists the type of grease that must be used for lubricating the bearings. Refer to *Table 18 on page 53* for lubricating schedule.

Re-lubrication is generally accompanied by a temporary rise in operating temperature. Excess grease will be purged at seals.

Recommended Lubricant for Fan Bearings

A Lithium / Petroleum base grease conforming to an NLGI Grade II consistency is normally used. Lubricant must be free of any chemical impurities such as free acid or free alkali, dust, rust, metal particles or abrasive. This light viscosity, low torque grease is rust inhibited and water resistant, has a temperature range of -30.0 to 200.0°F with intermittent highs of +250.0°F. Lubricate bearings as required by the severity of required duty.

TABLE 18 - FAN BEARING–LUBRICATION INTERVALS

RELUBRICATION SCHEDULE (MONTHS) BALL BEARING PILLOW BLOCKS									
SPEED (RPM)	**500**	**1000**	**1500**	**2000**	**2500**	**3000**	**3500**	**4000**	**4500**
SHAFT DIA									
1/2" thru 1-11/16"	6	6	5	3	3	2	2	2	1
1-15/16" thru 2-7/16"	6	5	4	2	2	1	1/2	1/4	1/4
2-11/16" thru 2-15/16"	5	4	3	2	1	1/2	1/2		
3-7/16" thru 3-15/16"	4	3	2	1	1/2	1/2			

Condenser Coils

Condenser coils should be kept clean and free of dirt, dust, and debris. Accumulation of dirt, dust, and debris could result in reduced performance, refrigerant system lockout, and/or compressor failure.

The microchannel coil cleaning procedure is significantly different than fin and tube type coils. Please follow the below procedure for cleaning microchannel coils

a. Remove surface debris with a vacuum cleaner using a soft brush instead of a hard plastic or metal tube. Compressed air can also be used blowing the dirt from inside out. If using a brush to remove the debris, ensure that the brush has soft bristles, NO wire brushes.

b. Rinse the coil with tap water. Do NOT use coil cleaners. Rinse the coil from the inside out, running water through every passage in the microchannel coil surface until it is clean. Use a gentle spray from a spray nozzle. Do NOT use a pressure washer. Pressure washers will cause damage to the microchannel coil surface

c. Because of the microchannel coil construction, water is retained longer than on standard fin and tube coils. It is generally recommended to blow or vacuum out the rinse water to speed the drying process and prevent water pooling.

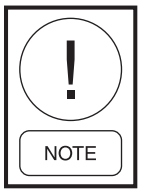
PERIODIC MAINTENANCE–THREE TO SIX MONTHS

Disconnect and lockout power from the unit anytime service is being performed on the fan section. Failure to do so could result in serious injury or death due to the fan turning ON while work is in progress.

Squealing belts during starting is caused by slipping belts that are not tensioned properly.

Motor Bearing Lubrication

Bearings must be re-lubricated periodically to assure long life. Motor bearing should be lubricated yearly, but may need lubrication more frequently, depending on severe operating conditions.



Removal of the relief plug on the motor bearing is required during greasing. Overgreasing the motor can cause bearing damage and will not be covered under unit warranty.

Belt Tension

Adjust the belt tension if necessary. Required belt tension data is supplied on the fan "skid" data plate, attached to the fan housing. Never use a belt dressing on the belts. If belts slip with the proper tension, use a good grade of belt cleanser to clean the belts. Refer to *Figure 23 on page 56 and Figure 24 on page 56.*

Never use excessive belt tension, as this could result in damaging the bearing, motor pulleys or motor base. See drive label on fan housing adjacent to drive for specific details on tension.

When it is necessary to replace one belt in a given set, the entire set of belts must be replaced.

PERIODIC MAINTENANCE–YEARLY

Check the fan wheels and inspect the drain pan for sludge and foreign material. Clean if required.

Observe the operation of all dampers and make any necessary adjustments in linkage and blade orientation for proper operation.

Entire Unit Inspection

In addition to the checks listed in this section, periodic overall inspections of the unit should be accomplished to ensure proper equipment operation. Items such as loose hardware, component operation, refrigerant leaks, unusual noises, etc. should be investigated and corrected immediately.

Sheave Alignment

To check sheave alignment, a straight edge or a piece of string can be used. If the sheaves are properly aligned, the string or straight edge will touch at all points, as indicated in *Figure 22 on page 55*. Rotating the sheaves will determine if the sheave is wobbly or the drive shaft is bent. Alignment error must be corrected to avoid bearing and belt failure.

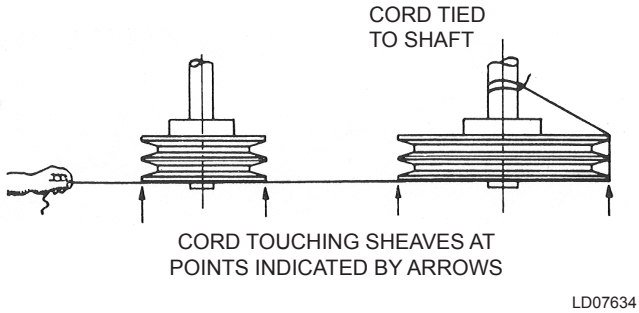


FIGURE 22 - SHEAVE ALIGNMENT

Belts

New belts should be re-checked after 24 hours of operation. On multiple belt adjustable pulleys, the pitch depth should be checked to insure identical belt travel, power transfer and wear. Adjustable motor bases are provided for belt adjustment.

Motor pulleys and blower shaft pulleys are locked in position with either setscrews or split taper lock bushings. All setscrews and/or taper lock bolts must be checked for tightness and alignment before putting equipment into operation.

An incorrectly aligned and tensioned belt can substantially shorten belt life or overload blower and motor bearings, shortening their life expectancy. A belt tensioned too tightly can overload the motor electrical, causing nuisance tripping of the motor overloads and/or motor failure and/or shaft failure.

Belt Replacement

Always replace belts as a set. Follow the steps below to replace belts:

1. Release the tension on the belts by loosening the adjusting nuts on the motor base.
2. Remove old belts and recheck the sheave alignment with a straight edge.
3. Install the new belts on the sheaves.

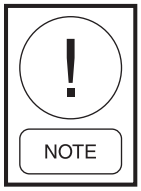
Never place the belts on the sheaves by using a screwdriver to pry the belt over the rim of the sheave. This will damage the belts permanently.

Belt Tensioning

Proper belt tensioning is required for optimum fan performance. Belts that are too loose could slip, and reduce the fan output. Belts that are too tight could cause premature bearing failure. Please follow the below procedure for obtaining proper belt tension. A belt tensioning tool will be needed for performing the below procedure.

This method should be used only for tensioning drives on which the grade of belt, rated belt capacity, service factor, design horsepower, etc. are known.

1. Measure span length (t) in inches as shown in *Figure 23 on page 56*, or calculate using formula.
2. From *Figure 23 on page 56,* the deflection height (h) is always 1/64 per inch of span length (t). For example, a 32" span length would require a deflection of 32/64" or 1/2".
3. Determine the minimum, maximum, and inital recommended pounds force using *Table 19 on page 56* or calculate based on the required Static Strand Tension (Ts).

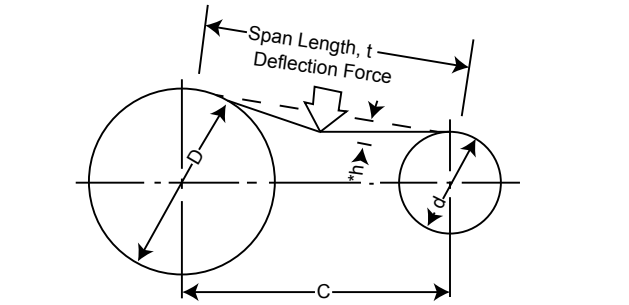


The initial recommended force is used only for installing new belts which have not seated themselves into the sheave grooves and where initial belt stretch has not taken place.

4. Using a spring scale, apply a perpendicular force to any ONE of the belts at the mid point of the span as shown in *Figure 23 on page 56*. Compare this deflection force wit the values found in Step 3.
    a. If the deflection force is below the minimum, the belts are too loose and the tension should be increased by increasing the center distance.
    b. If the deflection force is higher than the maximum, the belts are too tight and the tension should be decreased.

When new V-belts are installed on a drive the INITIAL tension will drop rapidly during the first few hours. Check tension frequently during the first 24 hours of operation. Subsequently retensioning should fall between the minimum and maximum force.

To determine the deflection distance from normal position, use a straightedge or stretch a cord from sheave to sheave to use as a reference line. On multiple belt drives an adjacent undeflected belt can be used as a reference.



* Deflection height
h= 1/64" per inch of span

where t = Span length, inches
C = Center Distance, inches
D = Larger sheave diameter, inches
d = Smaller sheave diameter, inches

$$t = \sqrt{C^2 - \left(\frac{D-d}{2}\right)^2}$$

$$h = \frac{t}{64}$$

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FIGURE 23 - DRIVE TENSIONING

TABLE 19 - RECOMMENDED MINIMUM FORCE PER BELT

Belt Selection	Small Sheave		Drive Ratio			
	Speed Range	Dia.	1.0	1.5	2.0	4.0 & Over
3V	1200-3600	2.65	2.0	2.4	2.6	3.0
	1200-3600	3.65	2.8	3.6	3.8	4.2
	1200-3600	4.75	3.8	4.2	4.4	4.8
	1200-3600	5.60	4.2	4.6	4.8	5.4
	1200-3600	6.90	4.6	5.0	5.2	5.6
5V	900-1800	7.1	8.5	9.5	10.0	11.0
	900-1800	9.0	10.0	11.0	12.0	13.0
	900-1800	14.0	12.0	13.0	14.0	15.0
	700-1200	21.2	14.0	15.0	16.0	17.0
8V	900-1800	12.5	18.0	21.0	23.0	25.0
	900-1800	14.0	21.0	23.0	24.0	28.0
	700-1500	17.0	24.0	26.0	28.0	30.0
	700-1200	21.2	28.0	30.0	32.0	34.0
	400-1000	24.8	31.0	32.0	34.0	36.0
3VX	1200-3600	2.20	2.2	2.5	2.7	3.0
	1200-3600	2.50	2.6	2.9	3.1	3.6
	1200-3600	3.00	3.1	3.5	3.7	4.2
	1200-3600	4.12	3.9	4.3	4.5	5.1
	1200-3600	5.30	4.6	4.9	5.1	5.7
	1200-3600	6.9	5.0	5.4	5.6	6.2
5VX	1200-3600	4.4	6.5	7.6	8.0	9.0
	1200-3600	5.2	8.0	9.0	9.5	10.0
	1200-3600	6.3	9.5	10.0	11.0	12.0
	1200-3600	7.1	10.0	11.0	12.0	13.0
	900-1800	9.0	12.0	13.0	14.0	15.0
	900-1800	14.0	14.0	15.0	16.0	17.0
AP	1800-3600	3.0	2.0	2.3	2.4	2.6
	1800-3600	4.0	2.6	2.8	3.0	3.3
	1800-3600	5.0	3.0	3.3	3.4	3.7
	1800-3600	7.0	3.5	3.7	3.8	4.3

TABLE 19 - RECOMMENDED MINIMUM FORCE PER BELT (CONT'D)

Belt Selection	Small Sheave		Drive Ratio			
	Speed Range	Dia.	1.0	1.5	2.0	4.0 & Over
BP	1200-1800	4.6	3.7	4.3	4.5	5.0
	1200-1800	5.0	4.1	4.6	4.8	5.6
	1200-1800	6.0	4.8	5.3	5.5	6.3
	1200-1800	8.0	5.7	6.2	6.4	7.2
CP	900-1800	7.0	6.5	7.0	8.0	9.0
	900-1800	9.0	8.0	9.0	10.0	11.0
	900-1800	12.0	10.0	11.0	12.0	13.0
	700-1500	16.0	12.0	13.0	13.0	14.0
DP	900-1500	12.0	13.0	15.0	16.0	17.0
	900-1500	15.0	16.0	18.0	19.0	21.0
	700-1200	18.0	19.0	21.0	22.0	24.0
	700-1200	22.0	22.0	23.0	24.0	26.0
AX	1800-3600	3.0	2.5	2.8	3.0	3.3
	1800-3600	4.0	3.3	3.6	3.8	4.2
	1800-3600	5.0	3.7	4.1	4.3	4.6
	1800-3600	7.0	4.3	4.6	4.8	5.3
BX	1200-1800	4.6	5.2	5.8	6.0	6.9
	1200-1800	5.0	5.4	6.0	6.3	7.1
	1200-1800	6.0	6.0	6.4	6.7	7.7
	1200-1800	8.0	6.6	7.1	7.5	8.2
CX	900-1800	7.0	10.0	11.0	12.0	13.0
	900-1800	9.0	11.0	12.0	13.0	14.0
	900-1800	12.0	12.0	13.0	13.0	14.0
	700-1500	16.0	13.0	14.0	14.0	15.0
DX	900-1500	12.0	16.0	18.0	19.0	20.0
	900-1500	15.0	19.0	21.0	22.0	24.0
	700-1200	18.0	22.0	24.0	25.0	27.0
	700-1200	22.0	25.0	27.0	28.0	30.0

Maximum Deflection Force = Minimum times 1.5
Initial Deflection Force = Minimum times 2.0

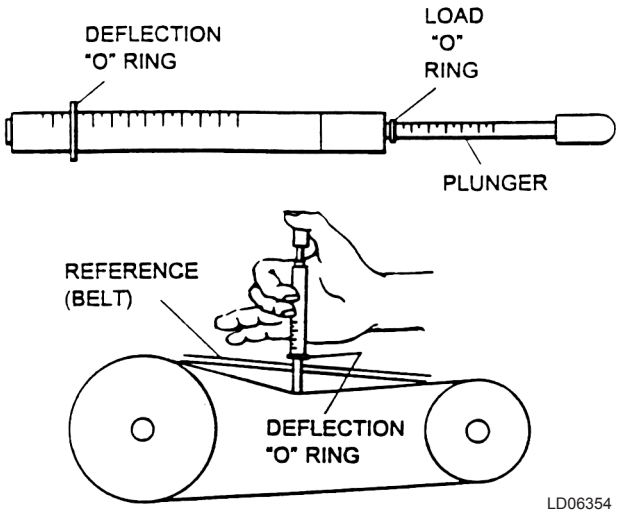

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FIGURE 24 - BELT TENSIONING GAUGE

Filter Drier Replacement

The filter/drier must be replaced any time work is performed on the refrigerant circuit. The rooftop unit comes with sealed type (non-replaceable) cores as standard. If the unit is not equipped with the optional valve package (suction, discharge, & liquid line valves), the refrigerant will need to be recovered with a recovery machine to replace the filter/drier.

If the unit is equipped with a valve package, the unit can be pumped down by closing the liquid line ball valve (prior to the filter/drier) while the unit is running, initiating a unit pump-down. The unit will shut off when the mechanical low-pressure switch opens. When the unit shuts down, close the ball valve located after the filter/drier and remove power from the unit to prevent the unit from running. Once the filter/drier core has been replaced, the filter/drier section should be evacuated via the Schrader access valve located next to the filter/drier prior to opening the ball valves and restoring the unit to normal operation.

Never shut the discharge valve while the unit is running. Doing so could cause a rupture in the discharge line or components, resulting in death or serious injury.

Never close the suction line ball valve with the compressor running. Doing so will cause the compressor to pump-down into a vacuum and damage the compressor due to internal arcing.

Forward Curved Fans

The forward curved fan wheel must be removed through the fan discharge opening. The location of other clamps, fan wheel, and shaft must be marked so each of these components can be reassembled in the same location (see *Figure 25 on page 57*). This will preserve the balance of the rotating assembly. Proceed with the following steps:

1. Disconnect all ductwork or guards attached to the blower housing to permit unobstructed access.
2. Remove the cut off plate attached at the discharge or blast area of the blower housing.
3. Thoroughly, clean the shaft of all grease and rust inhibitor. Be careful not to contaminate the bearing grease. Use emery cloth to remove all rust or the wheel may become “locked” to the shaft.
4. Loosen and remove setscrews on both bearing locking collars. Inspect and, if necessary, replace.
5. Loosen and remove setscrews from both sides of the wheel hub. Inspect and, if necessary, replace.
6. Using a rubber mallet or brass bar, slowly drive the shaft in one direction until the setscrew marks on the shaft are fully exposed. File the marks completely smooth. Drive the shaft in the opposite direction and file smooth the setscrew marks. Continue to clean the shaft of all dirt and residuals.

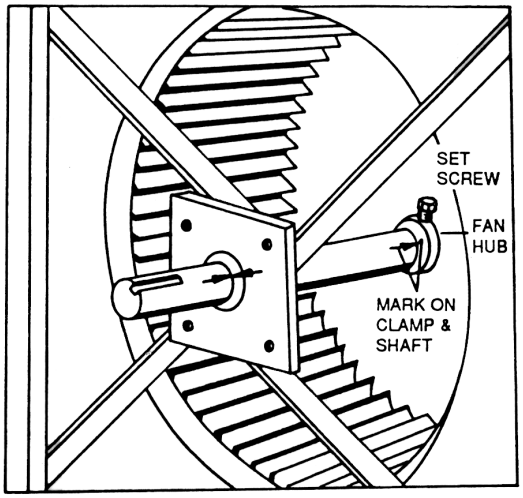

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FIGURE 25 - EXAMPLE OF FC FAN SHAFT/ WHEELMARKING

7. To remove the key, use a rubber mallet or brass bar to drive the shaft and wheel in one direction. Drive the key in the opposite direction using a nail set or smaller size key stock until the key is completely free of the wheel. Be sure that key does not get bent by allowing it to ride up the key way edge. The slightest bend will prevent quick assembly. Should this occur, replace the key stock.
8. Remove the shaft, supporting the weight of the wheel, particularly for larger diameter wheels. Do not allow the weight of the shaft to be supported by one bearing as you disassemble.
9. Remove the wheel through the discharge or outlet area of the blower housing.

10. Reassemble in reverse order, centering the wheel between the edges of the inlet venturi. If bearings were removed or replaced, be sure to reuse any shim stock found between the mounting support/ plate and bearing housings.
11. Torque all hardware.

Disconnect and lockout power from the unit anytime service is being performed on the fan section. Failure to do so could result in serious injury or death due to the fan turning ON while work is in progress.

Fan Motor

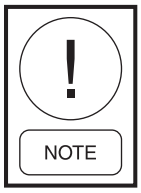
1. Shut off unit power and lock out.
2. Disconnect and tag power wires at motor terminals.
3. Loosen motor brace-to-mounting-rail attaching bolts.
4. Mark belt as to position. Remove and set aside belts.
5. Remove motor bracket hold down bolts.
6. Remove motor pulley and set aside.
7. Remove motor.
8. Install new motor. Reassemble by reversing steps 1–6. Be sure to reinstall multiple belts in their original position. Use a complete new set if required. Do not stretch belts over sheaves. Review the sections on motor and sheave installation, sheave alignment, and belt tensioning discussed previously.
9. Reconnect motor leads and restore power. Check fan for proper rotation as described in the *YORK 50–150 Ton Rooftop Unit Start-Up Checklist (Form YRK-CL2)*.

Fan Shaft Bearings

When removing and replacing the bearings, care should be taken to ensure that the area where the bearings fit on the shaft does not become scored or damaged. The shaft in this area should be thoroughly cleaned before the bearing is removed and again before the new bearing is installed.

Mounting Details

1. Check the shaft. It should be straight, free of burrs and full size. Be sure the bearing is not seated on a worn section of shafting.
2. Make certain any setscrews are not obstructing the bearing bore.
3. Align the bearing in its housing and slide the bearing into position on shaft (never hammer the ends of the inner race). If necessary, use a brass bar or pipe against the inner race to drift bearing into place (never hit the housing, as bearing damage may result). Make sure there is lubricant between the bearing outer ring and the housing.
4. Fasten the bearing housing to the unit mounting support with hex head cap screws, washers, new lock washers and hex nuts before securing the bearing to the shaft. This permits the bearing to align itself in position along the shaft and eliminates any possibility of cramping loads.
5. Rotate the shaft to make certain it turns freely.
6. Bearings may employ one of several different methods to lock the bearing to the shaft.



Shaft should be free from burrs. If old shaft is used, be sure a ball bearing is not seated on worn section and shaft is not bent.

There are various degrees of self-alignment in bearings of the same manufacturer. The force required for the self-alignment of the bearings used in YORK's manufactured units has been specified and is closely monitored at the factory. If it is necessary to purchase a bearing locally, be sure it can be worked around in the housing with a short shaft made of wood or other soft material placed in the bearing.

Prior to installing the bearing on the shaft, it should be worked around in the housing to make sure that self-alignment will be obtained where the bearing is installed. After the shaft journal has been inspected for cleanliness, metal chips or burrs, the bearing is slipped, not forced, onto the shaft. Forcing the bearing onto the shaft by the use of flange, pillow block, or outer ring will damage the bearing internally. Force applied in this way transmits the load to the inner race through the balls in the bearing. Since the bearings are not designed for axial loading, the sides of the races in which the balls turn can be damaged. If the bearing cannot be made to slip onto the shaft by pressing on the inner ring of the bearing, check the shaft for burrs. Install the bearing so the part of the inner race, which receives the locking collar or contains setscrews, is toward the outside of the unit.

If the grease fitting must be changed on bearings that utilize a locking pin under the fitting, it is important to properly replace it. If an adapter or grease fitting of improper size and length is used, the locking pin may be either too tight or loose and can affect the alignment and re-lubrication of the bearing.

Bearing Lock Devices

Various types of locking devices are used to secure bearing(s) to the fan shaft. Refer to the instructions packed with bearings for special information. *Figure 26 on page 59* is a typical bearing with a setscrew-type locking device. The various locking devices can be classified under basic types: eccentric locking type, concentric locking type, and Skwezloc type.

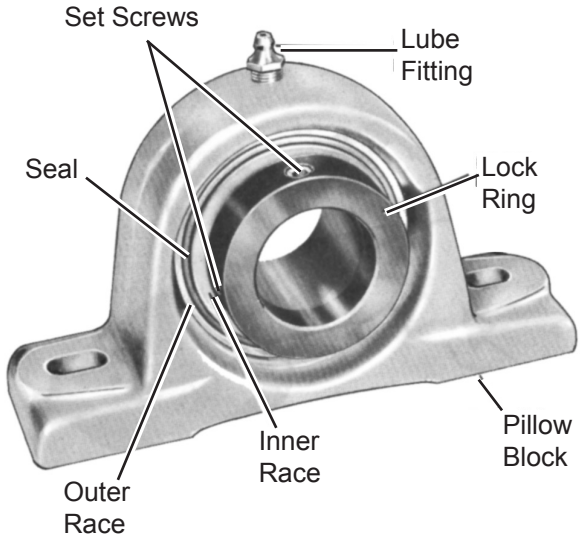


FIGURE 26 - BEARING WITH SETSCREW TYPE LOCKING DEVICE

Eccentric Type

An eccentric self-locking collar is turned and driven with a punch in the direction of shaft rotation to lock the bearing inner ring to the shaft. See *Figure 27 on page 59 and Figure 28 on page 60.*

When the eccentric collar is engaged to the cam on the bearing inner ring and turned in direction of rotation, it grips the shaft with a positive binding action. The collar is then locked in place with the setscrew provided in the collar.

The self-locking collar is placed on the shaft with its cam adjacent to the cam on the end of the bearing's wide inner ring. In this position, with collar and bearing cams disengaged, the collar's bore is concentric with that of the bearing's inner ring. The wide inner ring is loose on the shaft. By turning the collar in the direction of normal shaft rotation, the eccentric recessed cam will drop over and engage with the corresponding cam on the bearing inner, causing it to grip the shaft tightly with a positive binding action. See *Figure 28 on page 60.* Make sure the two cams engage smoothly and the locking collar is down flat against the shoulder of the inner ring. The wide inner ring is now locked to the shaft. Using a punch or similar tool in the drilled hole of the collar, tap the tool lightly to lock the collar in the direction of normal shaft rotation.

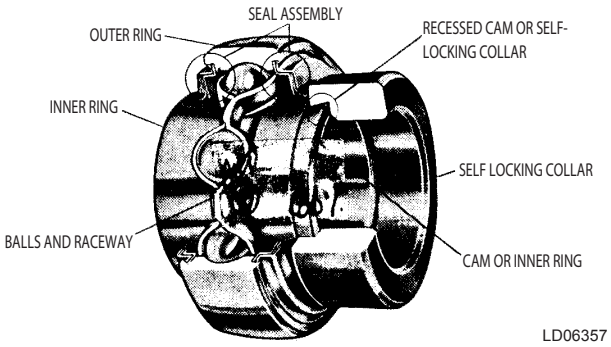
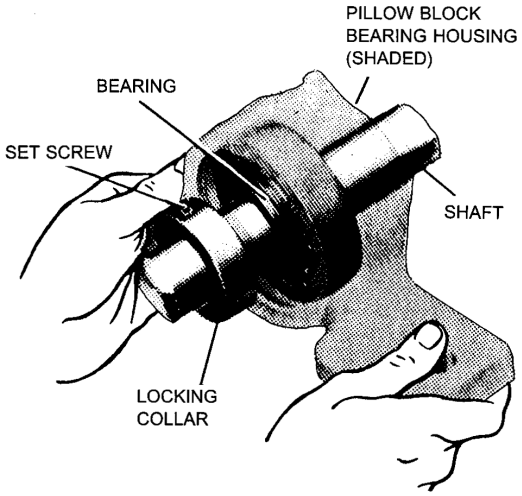


FIGURE 27 - BEARING WITH ECCENTRIC CAM



NOTE: Do Not apply excessive force to the bearing housing (pillow block or flange when installing the bearing on the shaft.

CAUTION

Do not apply excessive force to the bearing housing (pillow block or flange) when installing the bearing on the shaft.

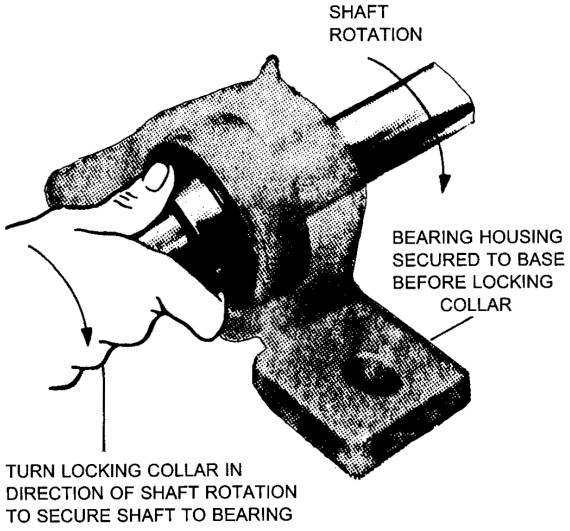


FIGURE 28 - ECCENTRIC CAM LOCKING COLLAR BEARING INSTALLATION

As a final step, the setscrew is tightened. Torque per *Table 20 on page 60*. It exerts a wedging action to hold the collar always in the engaged position, even under shock and reversing loads.

To disassemble, loosen the setscrew and tap the collar in the direction opposite shaft rotation.

When replacing split bearings, refer to manufacturer's instruction provided with the bearing. It is extremely important to ensure that proper radial clearances are observed between the roller bearings and outer face. Failure to make proper adjustments will cause premature failure of the bearing.

CAUTION

After proper installation of the bearing(s), run the unit for 10 to 15 minutes. Shut the unit down and lock it out. Check for proper engagement of locking collar and tightness of setscrew(s).

TABLE 20 - SETSCREW TORQUE

SET SCREW DIA.	HEX. SIZE ACROSS FLATS LBS.	MIN. RECOMMENDED TORQUE	
		INCH LBS.	FOOT LBS.
1/4 1/8	66 - 85	5.5 - 7.2	
5/16	5/32	126 - 164	10.5 - 13.7
3/8 3/16	228 - 296	19.0 - 24.7	
7/16	7/32	348 - 452	29.0 - 37.7
1/2 1/4	504 - 655	42.0 - 54.6	
5/8 5/16	1104 - 1435	92.0 - 119.6	

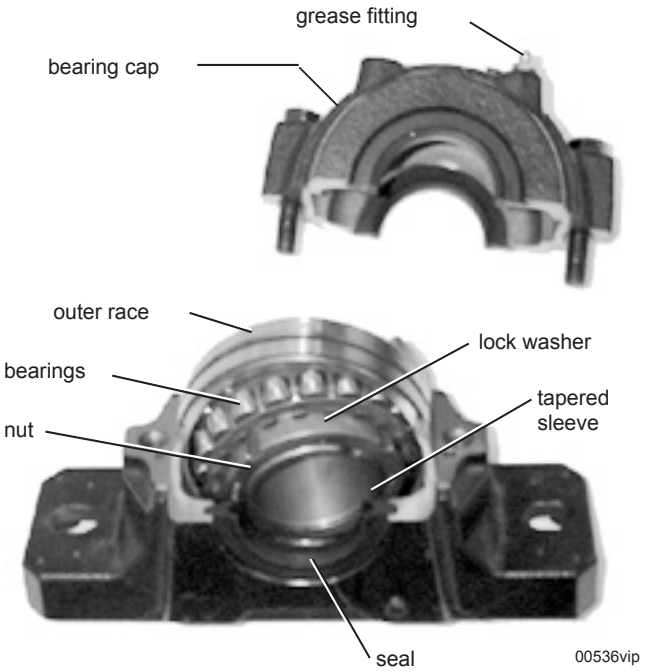


FIGURE 29 - SPLIT BEARING

SECTION 5–SEQUENCE OF OPERATION

INTRODUCTION

The Series 100 unit can operate as three different unit types. Each unit type has different programming and sequences of operation.

Series 100 units have tandem compressors installed for mechanical cooling. and also a supply fan with a Variable Frequency Drive (VFD). A control panel with a unit controller (IPU) is also installed on the units, which contains the necessary software for unit operation.

All other components are optional and you can select these during the ordering process.

Refer to the Unit Options label provided with each unit for information on the type options that are installed in the factory.

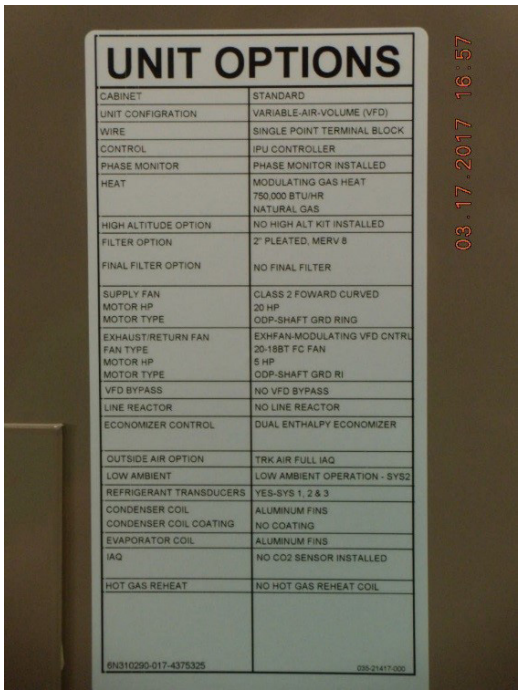


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FIGURE 30 - UNIT OPTIONS

UNIT TYPE

View or select the "Unit Type” in the Unit Data-Options Menu.

1. **Single Zone Variable Air Volume (SZVAV):**

   This is a HVAC system that does not have a VAV box installed in the duct work. These systems replace CV systems based on ASHRAE 90.1 2010.

   A SZVAV configured unit has a supply fan, controlled by a VFD, which can run at different speeds according to a cooling/heating demand or supply fan only demand.

   Series 100 units ordered as SZVAV do not have a duct static pressure transducer installed.

   SZVAV configured units do not control duct static pressure and do not have high duct static pressure protection.

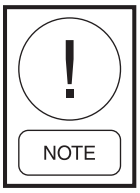
2. **Variable Air Volume (VAV):**

   This is a HVAC system that has VAV boxes installed in the ductwork. Typical VAV systems have overhead ductwork that provides conditioned air down to the space.

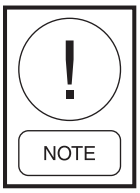
   A VAV unit has a supply fan, controlled by a VFD that is capable of running at different speeds to maintain a constant duct static pressure.

   The VFD speed is controlled by a duct static pressure transducer, which also provides high duct static pressure protection.

The SZVAV and VAV unit types are selected during the ordering process ad do not require changes in the field.



To see a complete list of the Options, Programs, and Setpoints menu's, as well as min/max values and factory defaults, refer to SECTION 6 – USER INTERFACE CONTROL CENTER.



Refer to SECTION 8 – SERVICE for a list of acronyms and abbreviations

UNIT OVERALL STATUS

The Series 100 IPU displays an Overall Status at the top of the Status-Menu. Use the Overall Status to determine if the status is Normal or if there is a problem.

The three unit types use the same Unit-Overall Status messages. *Table 21* describes the different Overall Status message.

Use the History button on the unit keypad to identify Active Warnings or Alarms.

- *"NIGHT SET BACK"* MUST be enabled for Unocc Cooling/Heating to operate
- Unit MUST have a valid zone temperature or it show a Sens/Misc fault and will not operate

PHASE MONITOR

Series 100 units have a 3 phase power monitor factory installed, except for units with dual point power.

The phase monitor is wired in series between CTB1 terminal 4 and the unit control/rocker switch.

The phase monitor is factory set to the unit voltage and can require some field adjustment.

The location of the phase monitor varies according to the unit tonnage range.

TABLE 21 - OVERALL STATUS MESSAGES

MESSAGE	UNIT OVERALL STATUS
LOCAL-STOP*	Unit Control switch is turned OFF
	No 24 VAC power to SD terminal on CTB1
	Power phase monitor is in a Fault condition
	BAS command to UNIT_STOP (AV93 or BV17)
RUN	The unit is ready to RUN
WARNING	The unit controller recognizes an active warning
UNIT LOCKOUT	The unit controller recognizes an active alarm that causes the unit to shut down
UNSTABLE SYSTEM	The unit controller identifies a significant drop in supply fan VFD speed. This is only applicable if the unit is twinned with another unit.
SMOKE PURGE 1	The unit is operating in a Smoke Purge sequence. This is a specialized sequence that is normally not used. See *Smoke Purge on page 103*
SMOKE PURGE 2	
SMOKE PURGE 3	

***NOTE:**

The control switch, SD terminal, and phase monitor are wired in series and provide 24 VAC to the I/O board. The SD terminal on CTB1 is where a remote shutdown device can be connected. A jumper is installed between 24 VAC and SD from the factory.

OCCUPANCY/UNOCCUPANCY DETERMINATION

The S100 units can operate in an Occupied (Occ) mode or Unocupied (Unocc) mode.

Occ and Unocc modes have different sequences for fan operation and cooling/heating operation. Occ and Unocc modes also have other sequences that include ventilation and exhaust.

Unit Occupancy is determined in the same way for each of the unit types.

To determine occupancy, use one of the following three steps, which are listed in order of priorty. For example if there is 24 VAC provided to the OCC terminal on the CTB1, this overrides any occupancy commands from the Internal Clock Schedule or the BAS.

1. **Hardwired**: 24 VAC input is provided to CTB1 at terminal OCC. The 24 VAC must be provided by the Series 100 unit. This is used with a device such as a timeclock or set of contacts from a field installed relay.
2. **Internal Clock Schedule**: The unit is programmed for Occ/Unocc times using the Internal Time Clock
3. **BAS Command**: A BAS system provides an Occ/Unocc signal to the Series 100 unit through a communicated command. (*BACnet MS/TP point AV88 or BV12 OCCUPANCY_CMD*)

NIGHT SET-BACK

Night Set-Back works with all unit configurations and allows for Unoccupied Cooling and Heating of the Series 100 unit.

The IPU unit must have a valid zone temperature reading for Night Set-Back to operate.

If Night Set-Back is used on units configured for VAV, open all VAV boxes during the Unoccupied mode.

Night Set-Back Set-Up

Night Set-Back must be User Enabled in the Program-Unit Data Menu.

Unoccupied Zone Cooling and Heating setpoints must be entered in the Setpoints-Cooling or Setpoints-Heating Menu.

Night Set-Back Sequence of Operation

1. The unit is in Unocc Standby mode.
2. The Current Zone Temp reaches 0.5°F above the Unocc Zone Cooling SP or 0.5°F below the Unocc Zone Heating SP.
3. The IPU starts the supply fan. The supply fan is controlled according to the unit configuration.
4. When the Air Proving switch is made, the IPU is stage on cooling or heating as determined by the Current Zone Temp. The cooling and heating operation is controlled according to the the unit configuration.

CURRENT OPERATING MODE

Cooling and heating operation is determined in different ways for the SZVAV and VAV units.

Refer to the following sections for further information on operating modes:

Comfort Venting Cooling	*Heating Operation on page 85*
Morning Warm-Up	

View the Current Operating Mode in the Status Menu. The IPU monitors standby mode switching to an active cooling/heating mode. The unit must be in standby mode for 3 minutes before switching to an active cooling/heating mode.

- Refer to *Table 22*.

TABLE 22 - CURRENT OPERATING MODE

CURRENT OPERATING MODE	UNIT TYPE	DESCRIPTION
Occupied Standby	All	There is no demand for cooling, heating, or dehumidification.
Occupied Cooling	VAV	There is a demand for cooling.
Occupied Cooling Low	SZVAV	There is a demand for low cooling.
Occupied Cooling High	SZVAV	There is a demand for high cooling.
Occupied Heating	VAV	There is a demand for heating.
Occupied Heating Low	SZVAV	There is a demand for low heating.
Occupied Heating High	SZVAV	There is a demand for high heating.
Unoccupied Standby	All	There is no demand for cooling, heating, or dehumidification.
Unoccupied Cooling	VAV	There is a demand for cooling.
Unoccupied Cooling Low	SZVAV	There is a demand for low cooling.
Unoccupied Cooling High	SZVAV	There is a demand for high cooling.
Unoccupied Heating	VAV	There is a demand for heating.
Unoccupied Heating Low	SZVAV	There is a demand for low heating.
Unoccupied Heating High	SZVAV	There is a demand for high heating.
Comfort Vent Cooling	SZVAV	There is a demand for cooling.
Comfort Vent Heating	SZVAV	
Morning Warm-Up	All	There is a demand for heating.
Occupied Dehum W/ Cooling	VAV or SZVAV	There is a demand for dehumidification.
Occupied Dehum Cool Low	VAV or SZVAV	There is a demand for low dehumidification.
Occupied Dehum Cool High	VAV or SZVAV	There is a demand for high dehumidification.
Unoccupied Dehum W/ Cooling	VAV or SZVAV	There is a demand for dehumidification.
Unoccupied Dehum Cool Low	VAV or SZVAV	There is a demand for low dehumidification.
Unoccupied Dehum Cool High	VAV or SZVAV	There is a demand for high dehumidification.

SINGLE ZONE VARIABLE AIR VOLUME (SZVAV)

A SZVAV system does not have VAV boxes installed in the duct work. These systems replaced CV systems per ASHRAE 90.1 2010.

A SZVAV unit has a supply fan, controlled by a Variable Frequency Drive (VFD) that is capable of running at different speeds according to a cooling/heating demand or supply fan only demand.

A duct static pressure transducer is not installed on-Series 100 units that are ordered as SZVAV.

SZVAV units cannot control duct static pressure and do not have high duct static pressure protection.

SZVAV units are controlled by either a standard thermostat (staged) input or a zone temperature input.

SZVAV Set-Up

1. Set the unit type to Single Zone VAV in the Options-Unit Data Menu.
2. Set Zone Control Method in the Program-Unit Data Menu
3. Set Single Zone VAV Min VFD Speed in Setpoints-Supply System Menu.
4. Set the Unit Design Airflow in the Setpoints-Unit Data Menu.
5. Set Occ Zone Cooling SP in the Setpoints-Cooling Menu (Zone Control Method is Wired or Comm Zone Temp).
6. Set first and second stage cooling SP's in the Setpoints-Cooling Menu.

If a heating source is installed on the unit:

1. Set Occ Zone Heating in the Setpoints-Heating Menu (Zone Control Method is Wired or Comm Zone Temp)
2. Set first and second stage heating SPs in the Setpoints-Heating Menu.

If the Zone Control Method is set to Wired or Com Zone temp, check that the IPU has a valid zone temperature reading. a BASand over shooting of the *"ACTIVE SAT"* setpoint. This under/over shooting should normally stay within +/- 3.0 °F. There could be some infrequent times where this under/over shoot approaches +/- 5.0°F.

SUPPLY FAN

The Supply Fan must run before other unit operations begin.

The unit control monitors the status of the an air proving switch to determine the supply fan status.

Before cooling, heating, or other operations can begin, the air proving switch must be closed. This proves the Supply Fan Status.

The supply fan starts when there is a demand for cooling or heating, regardless of occupancy.

The supply fan can operate continuously in the Occ Mode is Continous Ventilation (Program-Ventilation) is user enabled.

The Supply Fan starts if Zone Control Method is set to Staged and there is a demand for G either from a thermostat or from the BAS.

Supply Fan Status

The Series 100 units use an Air Proving Switch (APS) to determine supply fan status. The APS is a diaphram type switch that closes at approximately .30" WC and is mounted about the supply fan blower assembly.

The APS needs to close and prove supply fan status within 45 seconds after the supply fan is turned on. Failure to prove supply fan status within 45 seconds causes a Supply Fan-Lockout.

A Supply Fan-Lockout also occurs if the APS opens for more than 2 seconds once fan status is proven as RUNNING.

According to ASHRAE 90.1 2010, Series 100 units have a Supply Fan VFD installed to control the speed of the supply fan based on cooling/heating demands or standby operation when configured for SZVAV.

SZVAV MINIMUM SPEED

The SZVAV minimum speed is a user adjustable SP and is found under Setpoints-Supply System. The supply fan operates at SZVAV minimum speed.

1. Hardwired
2. Outside Air
3. Return Air
4. Supply Fan VFD Speed

TABLE 23 - SZVAV SUPPLY FAN SPEED

FAN SPEED	DESCRIPTION
Supply Fan at SZVAV Min Speed	Occ Standby (Continuous Vent is User Enabled)
	Occ/Unocc Cooling low
Supply Fan speed is modulating up/down	There is a demand for cooling. The current RAT is 0.5°F above the *"ACTIVE RAT COOLING"* setpoint.
Supply Fan Speed at 100%	There is a demand for low cooling. The current zone temperature is 0.5°F above the *"ACTIVE OCC ZONE COOLING"* setpoint.
	Occ Cooling High (See above)
	Unocc Cooling High (See Above)
	Occ Heating Low
	Occ Heating High
	Unocc Heating Low
	Unocc Heating High
	Comfort Vent Cool
	Comfort Vent Heat
	Morning Warm-Up
Supply Fan is OFF	Occ Standby (Continuous Vent is User Disabled)
	Unocc Standby

CONTINUOUS VENTILATION

Continuous Ventilation is a user adjustable program that allows the supply fan to run continuously when it is in the Occ mode. It is found under Program-Ventilation.

When Continuous Ventilation is enabled by the user,the supply fan is ON when the unit is in an Occ mode.

When Continuous Ventilation is disabled by the user, the supply fan starts when there is a demand for cooling or heating. The APS must be closed before cooling of heating operation is permitted.

SUPPLY FAN MODULATION

When the S100 unit is in Occ Standby (Continuous Vent-User Enabled) or Occ/Unocc Cooling Low, the supply fan runs at the SZVAV minimum speed.

If the current zone temperature rises 1.5°F above te active zone temperatiore SP, the IPU increases the supply fan speed.

The supply fan speed increases as the zone temperature rises higher than the active zone temperature SP.

When the zone temperature is higher than the active zone temperature SP by 2.5°F, the supply fan is 100% (full speed).

Cooling and Heating Operation

Cooling and heating demands on a SZVAV unit are determined by either of the following:

A. Zone temperature
   - Wired Zone Temperature
   - Communicated Zone Temperature

B. Stage Input
   - Thermotstat (2 stage cooling/heating)
   - BAS commands

Select the Zone Control Method under the Program-Unit Data Menu.

Wired Zone Temp: Hardwired senror to CTB1. 10K Type III thermistor.

- **Comm Zone Temp**: Zone temperature signal from a BAS (BACnet MS/TP point AV40 Zone_ TEMP_BAS).
- **Staged**: Either a thermostat is connected to the appropriate terminals on CTB1 or BAS commands are used for Y1, Y2, W1,W2, and G.

View the Occ/Unocc cooling SP under the Cooling-Setpoints Menu.

View the Occ/Unocc heating SP under the Heating-Setpoints Menu.

These SPs are also available on a BAS.

TABLE 24 - SZVAV CURRENT UNIT MODES

MODE	DESCRIPTION
Occ Standby	There is no demand for cooling or heating
	Supply Fan at SZVAV Min Speed if there is a demand for G either from a thermostat or from the BAS
	Supply fan at SZVAV Min Speed if Continuous Vent is User Enabled
	Supply fan OFF if Continuous Vent is User Disabled
Occ Cooling Low	Current zone temp is 0.5 deg F above the Occ/Unocc Zone Cooling SP
	There is a demand for Y1 either from a thermostat or from the BAS
	Supply Fan at SZVAV Min Speed
Occ Cooling High	Current zone temp is 1.5°F above the Occ/Unocc Zone Cooling SP.
	There is a demand for Y2 either from a thermostat or from the BAS
	At this point the supply fan speed starts to increase as the cooling demand increases, and decrease as the cooling demand decreases. (See Note at bottom)
	The supply fan is at 100% when the current zone temp is above the Occ/.Unocc Zone Cooling SP by 2.5°F
Occ Heating Low	Current zone temp is 0.5 deg F below the Occ/Unocc Zone Heating SP
	There is a demand for W1 either from a thermostat or from the BAS
Occ Heating High	Current zone temp is 1.5 deg F below the Occ/Unocc Zone Heating SP
	There is a demand for W2 either from a thermostat or from the BAS
	Supply Fan at 100%
Unocc Standby	There is no demand for cooling or heating. Supply fan is OFF
Comfort Vent Cooling	See Description in Ventilation Section
Comfort Vent Heating	See Description in Ventilation Section
Morning Warm-Up	See Description in Heating Section
Unocc Cooling Low	Current zone temp is 0.5 deg F over the Unocc Zone Cooling SP.
	There is a demand for Y1 either from a thermostat or from the BAS
	Supply Fan at SZVAV Min Speed
Unocc Cooling High	Current zone temp is 1.5°F over the Unocc Zone Cooling SP.
	There is a demand for Y2 either from a thermostat or from the BAS
	At this point the supply fan speed starts to increase as the cooling demand increases, and decrease as the cooling demand decreases. (See Note)
	The supply fan is at 100% when the current zone temp is above the Unocc Zone Cooling SP by 2.5°F
Unocc Heating Low	Current zone temp is 0.5 deg F under the Unocc Zone Heating SP
	There is a demand for W1 either from a thermostat or from the BAS
	Supply Fan at 100%
Unocc Heating High	Current zone temp is 1.5 deg F under the Unocc Zone Heating SP
	There is a demand for W2 either from a thermostat or from the BAS
	Supply Fan at 100%

Note:

Whe SZVAV unit is controlled by a staged unit, a demand for Y2 causes the supply fan to go directly to 100% from SZVAV Min Speed. There is not modulation as with Zone Temperature.

SZVAV Supply Air Temperature

When a SZVAV unit enters an active cooling or heating mode, the unit controller utilzes as many stages of cooling or heating as needed to achieve and maintain the Active SAT SP.

If outside air conditions are suitable, the economizer operation is also included.

First and second stage cooling SPs are found under Setpoints-Cooling Menu.

First and second stage heating SPs are found under Setpoints-Heating Menu.

These SPs are also available on a BAS.

Active SAT SPs for each unit mode in SZVAV are described in *Table 25*

TABLE 25 - SZVAV SUPPLY AIR TEMPERATURE SETPOINTS

	DESCRIPTION
Occ Standby	There is no demand for cooling or heating.
Occ Cooling Low	Active Cooling SAT SP is the 1st Stage Cooling SP
Occ Cooling High	Active SAT Cooling SP is the 2nd Stage Cooling SP
Occ Heating Low	Active SAT Heating SP is the 1st Stage Heating SP
Occ Heating High	Active SAT Heating SP is the 2nd Stage Heating SP
Unocc Standby	There is no demand for cooling or heating. Supply fan is off
Unocc Cooling Low	Active SAT SP is the 1st Stage Cooling SP
Unocc Cooling High	Active SAT SP is the 2nd Stage Cooling SP
Unocc Heating Low	Active SAT SP is the 1st Stage Heating SP
Unocc Heating High	Active SAT SP is the 2nd Stage Heating SP

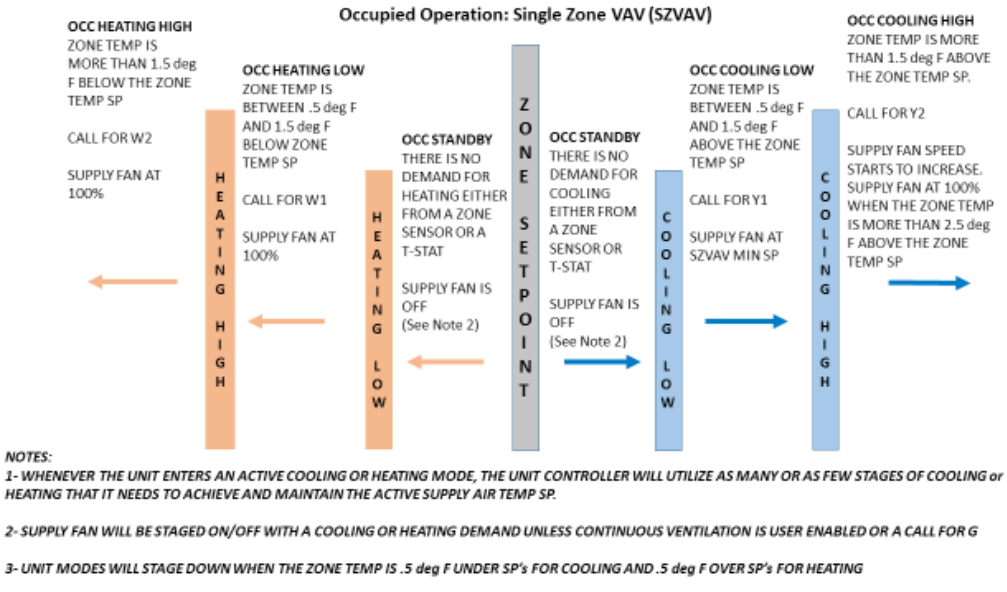


FIGURE 31 - OPERATION: SINGLE ZONE VAV (SZVAV)

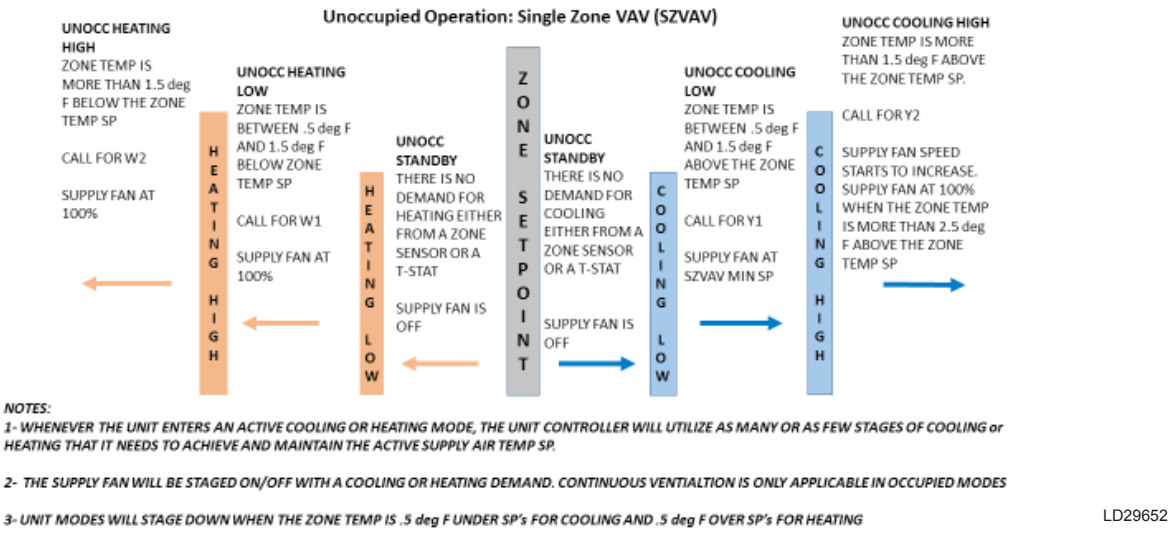


FIGURE 32 - UNOCCUPIED OPERATION: SINGLE ZONE VAV (SZVAV)

VARIABLE AIR VOLUME (VAV)

The Variable Air Volumn system hasVAV boxes installed in the ductwork. Typical VAV systems have overhead ductwork that provides conditioned air down into the space.

A VAV unit has a supply fan, controlled by a VFD that can run at different speeds to maintain a contstant duct static pressure.

The VFD speed is controlled by a duct static pressure transducer that also provides high duct static pressure protection.

VAV Setup

1. Set the unit type to Variable Air Volume in the Options-Unit Data Menu.
2. Set Duct Static Low and High SPs in the Setpoints-Supply System Menu.
3. Set Unit Design Airflow in the Setpoints-Unit Data Menu.
4. Set RAT Cooling SP in the Setpoints-Cooling Menu.
5. Set SAT Low and High SP's in the Setpoints-Cooling Menu.
6. Set Unocc Zone Cooling SP in the Setpoints-Cooling Menu if utilizing Night Set-Back.
7. Set RAT Heating SP in the Setpoints-Heating Menu (if applicable).
8. Set Heating SAT SPs in the Setpoints-Heating Menu (if applicable).
9. Unocc Zone Heating SP must be set in the Setpoints-Heating Menu if utilizing Night Set-Back.
10. The IPU must have a valid zone temperature reading if it is using Night Set-Back:
    - Hardwired zone sensor to CTB1
    - Communicated zone temperature from the BAS

Supply Fan

The Supply Fan must be running before any other unit operation begins.

The IPU monitors the status of an air proving switch (APS) to determine the supply fan status.

When a VAV configured unit is in the Occ mode, the-supply fan is ON. In the Unocc Mode, the supply fan is cycled ON/OFF with a cooling/heating demand.

The IPU proves a start/stop signal to the supply fan VFD.

The IPU outputs a 0-10 VDC signal to the supply fan VFD to control the speed.

The supply fan speed is controlled to achieve and maintain the Active Duct Static Pressure SP.

SUPPLY FAN STATUS

The Series 100 units use an Air Proving Switch (APS) to determine supply fan status.

The APS is a diaphragm type switch that closes at approximately 0.30” WC and it is mounted above the supply fan blower assembly.

The APS senses the static pressure through a factory installed tube that passes through the supply fan wall into the next section of the unit.

The APS needs to close and prove supply fan status within 45 seconds after the supply fan is commanded on.

Failure to prove supply fan status within 45 seconds causes a Supply Fan-Lockout to occur.

A Supply Fan-Lockout also occurs if the APS opens for more than 2 seconds when the fan status is proven to be RUNNING.

Supply Fan Control

A VAV configured unit has a supply fan VFD and a duct static pressure transducer installed at the factory

The duct static transducer sends a 0-5 VDC signal to the IPU according to the static pressure that it is sensing. The IPU reads the 0-5 VDC input, and sends a 0-10 VDC signal out to the VFD to control the speed to the Active Duct Static Pressure SP.

TABLE 26 - VAV SUPPLY FAN SPEED

	DESCRIPTION
Occ Standby	Supply Fan VFD controlled to maintain Active Duct Static SP
Occ Cooling	Supply Fan VFD controlled to maintain Active Duct Static SP
Occ Heating	Supply Fan VFD controlled to maintain Active Duct Static SP
Unocc Standby	Supply Fan is OFF
Unocc Cooling	Supply Fan VFD controlled to maintain Active Duct Static SP
Unocc Heating	Supply Fan VFD controlled to maintain Active Duct Static SP
Morning Warm-Up	Supply Fan VFD controlled to maintain Active Duct Static SP

DUCT STATIC RESET

A VAV configured unit can reset the Active Duct Static Pressure SP .

Duct Static Reset can be initiated by hardwired or BAS.

- **Hardwired**

  0-5 VDC signal connected to CTB1, terminals 25, 26, and 27.

- **BAS**

  A 0-5 command sent to the unit via the BAS, BACnet MS/TP point AV05. Duct Pres RST BAS must also be User Enabled. Duct Pres RST BAS is found in the Service-Menu.

If Duct Static Reset is User Disabled, the Active Duct Static SP is always the Duct Static Reset High SP.

If Duct Static Reset is User Enabled, the Active Duct Static Pressure SP is either the Duct Static Reset High SP, Duct Static Reset Low SP, or between both of these SPs, depending on the reset signal that is sent to the unit controller.

The Duct Static High and Low SP's and the Duct Overpressure SP are located under the Setpoints-Supply System Menu

These setpoints are also available on a BAS.

DUCT STATIC RESET HIGH SP

The Duct Static Reset High SP is the Active Duct Static Pressure SP the unit controller attempts to maintain when Duct Static Reset is User Disabled. The high end of the static pressure range when Duct Static Reset is User Enabled.

Duct Static Reset Low SP

Duct Static Reset Low SP is the low end of the duct static pressure range when duct static reset is User Enabled

Duct Static Over Pressure

Duct Static Over Pressure causes the unit to immediately shutdown on a Duct-High Pressure Alarm.

5

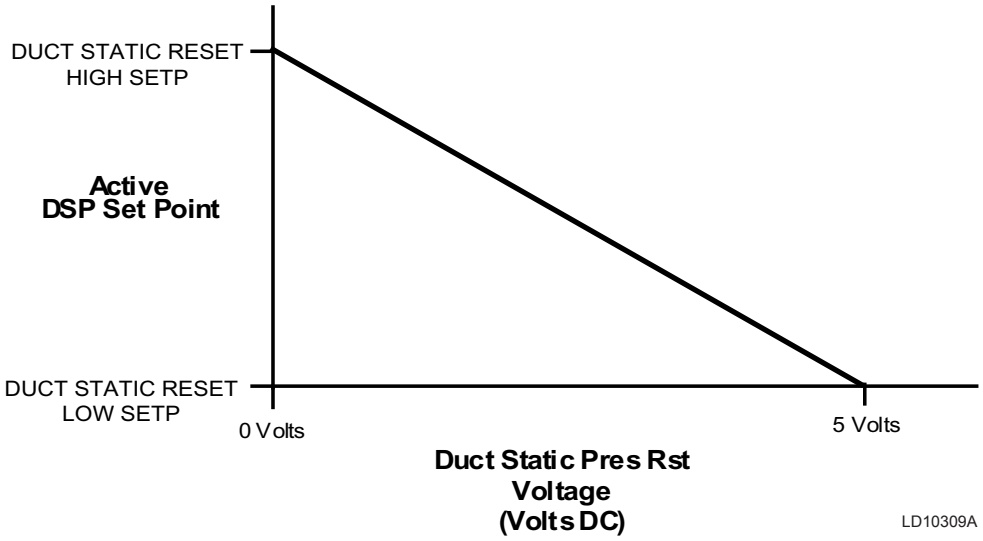
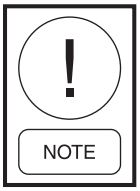


FIGURE 33 - ACTIVE DSP SETPOINT

SUPPLY FAN SYNC

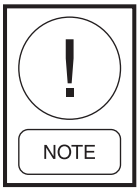


Supply Fan Sync is only applicable for Series 100 units configured as VAV.

The Series 100 unit can synchronize the operation of the supply fans when units of the same tonnage are installed in a master/satellite arrangement. This action is also known as twinning.

BAS uses Supply Fan Sync to input the same VDC signal to two or more units to ensure the supply fans run at the same speed.

Install field provided isolation dampers and manual reset duct static pressure safety switches when operating in this type of arrangement.



To utilize this sequence, Supply Fan Sync must be User Enabled

Supply Fan Sync is found under the Program-Supply System Menu.

To utilize this sequence, a 0-5 VDC signal must be provided to CTB1 terminals 25, 26, and 27

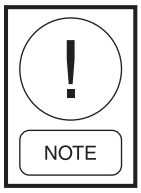
a. 25: +5 VDC (Duct Static setpoint +5 VDC_
b. 26: DSP+ (Duct Static Reset +)
c. 27: DSP- (Duct Static Reset -)

The unit controller requires approximately 1 VDC to start the supply fan. *Table 27* describes the expected speeds and speed percentage at different VDC signals.

If the VDC signal drops to approx 0.5 VDC, the supply fan shuts down.

TABLE 27 - SUPPLY FAN SYNC CONTROL

VDC SIGNAL	SUPPLY FAN SPEED
1 VDC	20% at approx 32hz
2 VDC	40% at approx 40hz
3 VDC	60% at approx 46hz
4 VDC	80% at approx 53hz
5 VDC	100% at approx 60hz



We recommend installing the tubing from the duct pressure transducer to the proper location in the unit ductwork. The duct pressure transducer provides the only factory installed duct over pressure device.

COOLING AND HEATING OPERATION

On a VAV configured unit, cooling and heating demands in Occ operation are determined by the Current Return Air Temp.

The IPU compares the current RAT against the RAT Cooling SP and the RAT Heating SP to determine when to enter an active cooling or heating mode.

If the current RAT remains between the RAT Cooling SP and the RAT Heating SP the unit remains in Occ Standby.

RAT Cooling SP is found under the Setpoints-Cooling Menu. RAT Heating SP is found under the Setpoints-Heating Menu

In Unocc Operation, cooling and heating demands are determined by the Current Zone Temp

Unocc Cooling and Heating is only allowed if Night-Setback is User Enabled.

Unocc Cooling Zone SP is found under the Setpoints-Cooling Menu. Unocc Heating Zone SP is found under the Setpoints-Heating Menu

If the IPU does not identify a valid zone temp and Night Set-Back is User Enabled, a Fault occurs and causes a Unit-Lockout

Night-Setback is found under the Program-Unit Data Menu

These setpoints are also available on a BAS.

TABLE 28 - VAV UNIT MODE

	DESCRIPTION
Occ Standby	Occ Standby (Continuous Vent is User Enabled)
Occ Cooling	Current RAT is above the Active Cooling RAT SP by 0.5ºF
Occ Heating	Current RAT is below the Active Heating RAT SP by 0.5ºF
Unocc Standby	No demand for cooling or heating exists
Unocc Cooling	Current Zone Temp is above the Unocc Cooling Zone SP by 0.5ºF
Unocc Heating	Current Zone Temperature is below the Unocc Heating Zone SP by 0.5ºF

ACTIVE SUPPLY AIR TEMP SP

When a VAV configured unit enters an active cooling or heating mode, the IPU turns ON/OFF stages of cooling or heating to achieve and maintain the Active SAT SP. This includes economizer operation if Outside Air conditions are suitable.

Cooling Mode

In the cooling mode, the Active Cooling SAT SP can be a fixed value, or it can be reset by taking advantage of control logic built into the unit controller, SAT Reset Method.

Heating Mode

In the heating mode, the Active Heating SAT SP is a fixed value, and cannot be reset like the Active Cooling SAT SP.

SAT Reset Method

The SAT Reset Method is found in the Options-Unit Data Menu. A VAV configured unit can reset the Active Cooling SAT SP by using one of four methods.

Three methods use internal programming and logic, Return Air, Outside Air, and Supply Fan Speed. The fourth method uses a VDC signal sent from a field installed controller, or a command from a BAS.

The four methods are as follows:

1. **Hardwired**
    - Built-in logic, which resets the Active SAT SP based on either a 0-5 VDC signal to CTB1 or a 0-5 command from the BAS.
    - To use the 0-5 command from the BAS, SAT Reset BAS must be User Enabled. SAT Reset BAS is found under the Service-Menu

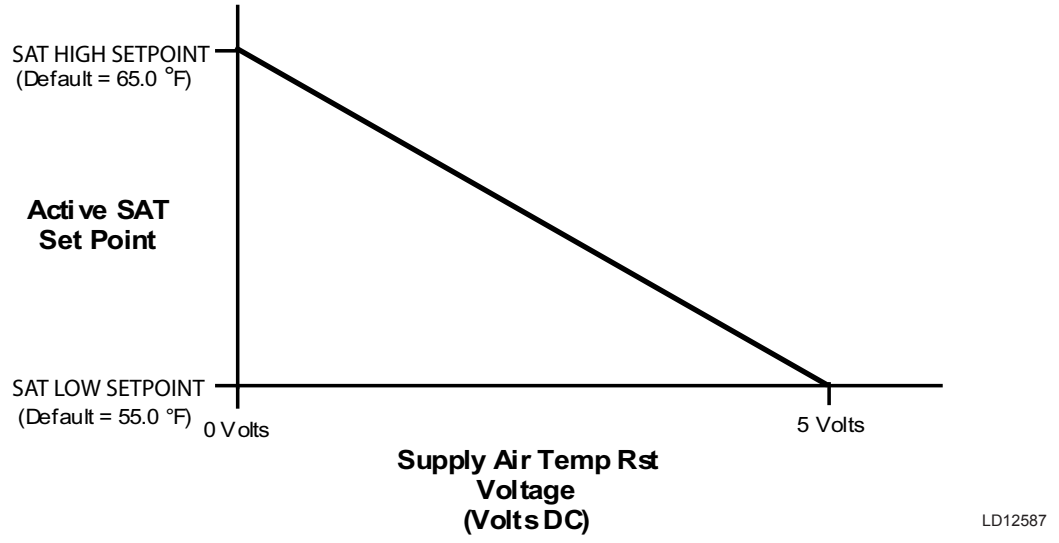


FIGURE 34 - ACTIVE COOLING SAT SP VS HARDWIRED SAT RESET SIGNAL/COMMAND

- A VDC signal or BAS command of 0 causes the Active Cooling SAT SP to be the SAT High SP.
- A VDC signal or BAS command of 5 causes the Active Cooling SAT SP to be the SAT Low SP
- A VDC signal or BAS command between 0-5 causes the Active Cooling SAT SP to be between the SAT High and SAT Low SP per the diagram below
- If a fixed SAT SP is required, select this SAT Reset sequence, and set the SAT High SP to the required value.

2. Return Air Temperature

- Built-in logic that resets the Active SAT SP based on the Current RAT. A VDC signal or BAS command is not required to perform this sequence. The IPU monitors the Current RAT and resets the Active SAT setpoint as needed.
- A Current RAT that is equal to or below the RAT setpoint for High SAT causes the Active Cooling SAT to be the SAT High setpoint.
- A Current RAT that is equal to or above the RAT SP for Low SAT causes the Active Cooling SAT SP to be the SAT Low setpoint.
- A Current RAT that is between the RAT SP for High SAT and the RAT SP for Low SAT cause the Active Cooling SAT SP to be between the High SAT and Low SAT setpoints.

3. Outside Air Temperature

- Built-in logic that resets the Active SAT SP based on the Current OAT.
- VDC signal or BAS command is not required to perform this sequence.
- The IPU monitors the Current OAT and resets the Active SAT SP as needed
- A Current OAT that is equal to or below the OAT SP for High SAT causes the Active Cooling SAT SP to be the SAT High SP
- A Current OAT that is equal to or above the OAT SP for Low SAT causes the Active Cooling SAT SP to be the SAT Low SP.
- A Current OAT that is between the OAT SP for High SAT and the OAT SP for Low SAT causes the Active Cooling SAT SP to be between the High SAT and Low SAT SP.

4. Supply Fan VFD Speed

- Built-in logic that resets the Active SAT SP based on the Current Supply Fan VFD Speed
- VDC signal or BAS command is not required to perform this sequence

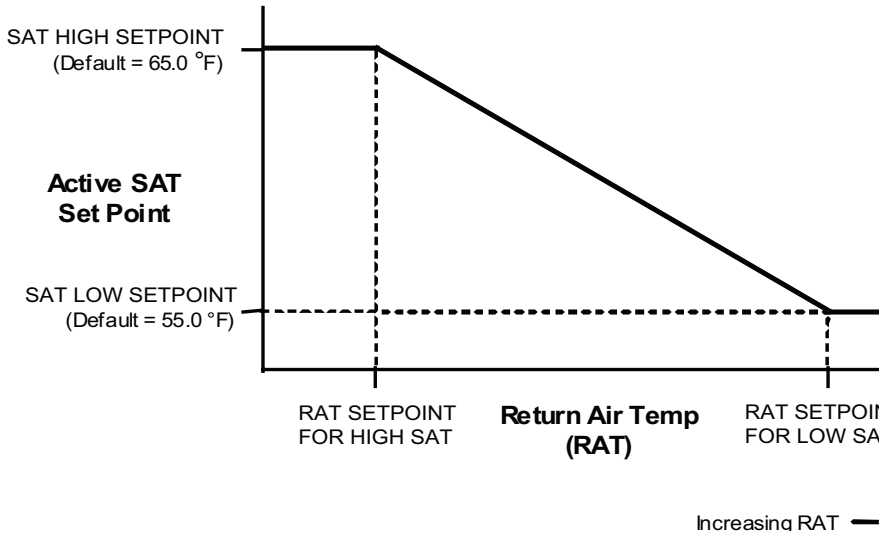


FIGURE 35 - ACTIVE COOLING SAT SETPOINT VS. CURRENT RETURN AIR TEMPERATURE

- The IPU monitors the Current Supply Fan Speed and resets the Active SAT SP as needed
- A Current Supply Fan Speed that is equal to or below the Fan Speed for High SAT causes the Active Cooling SAT SP to be the SAT High SP
- A Current Supply Fan Speed that is equal to or above the Fan Speed for Low SAT causes the Active Cooling SAT SP to be the SAT Low SP.

Setpoints

Setpoints for SAT Reset Method listed in the above sequences are found under the Setpoints-Cooling Menu

The reset setpoints for RAT, OAT, or Supply Fan Speed are only shown when that SAT Reset Method is selected.

The Heating SAT SP is found under the Setpoints-Heating Menu

These setpoints are also available on a BAS.

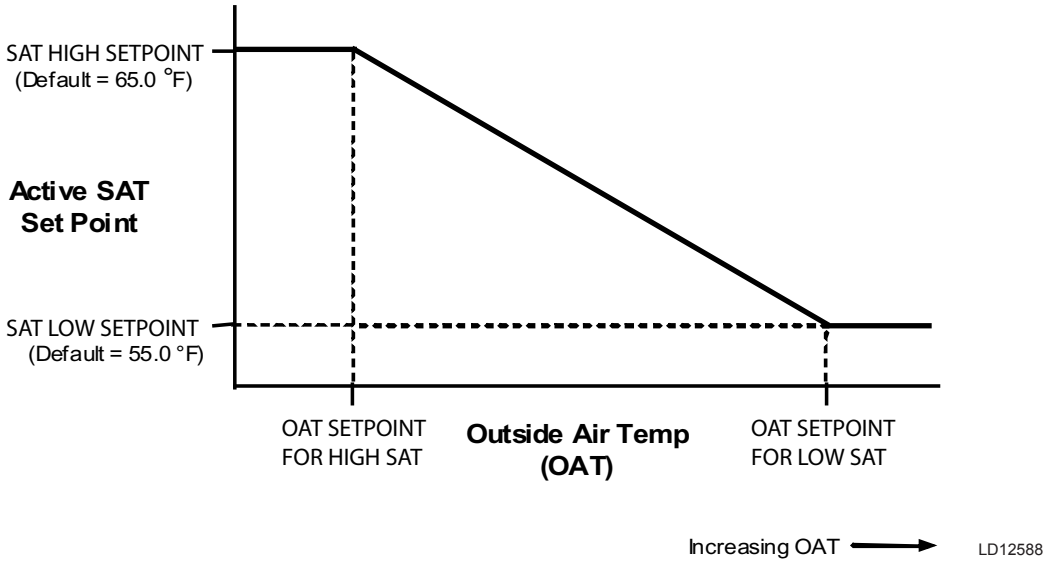


FIGURE 36 - ACTIVE SAT SETPOINT VS. OUTSIDE AIR TEMP

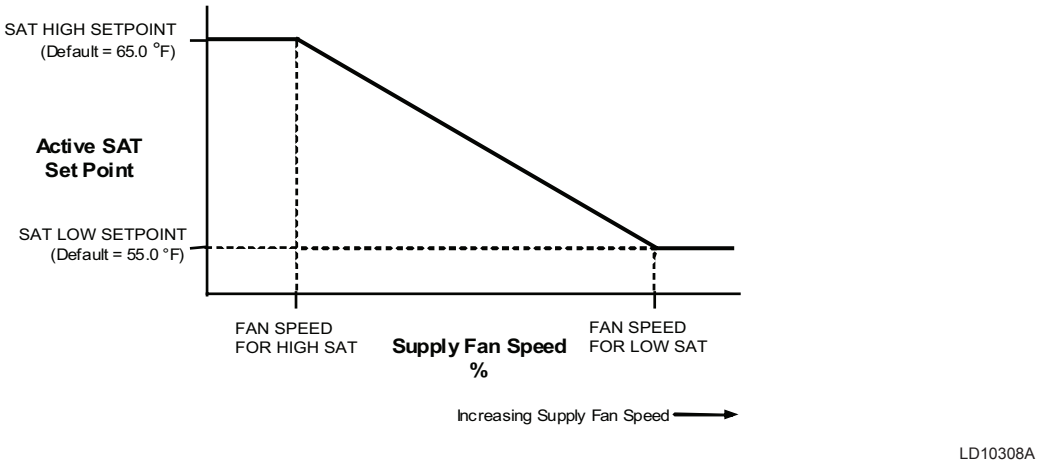


FIGURE 37 - ACTIVE SAT SETPOINT VS. OUTSIDE AIR TEMP

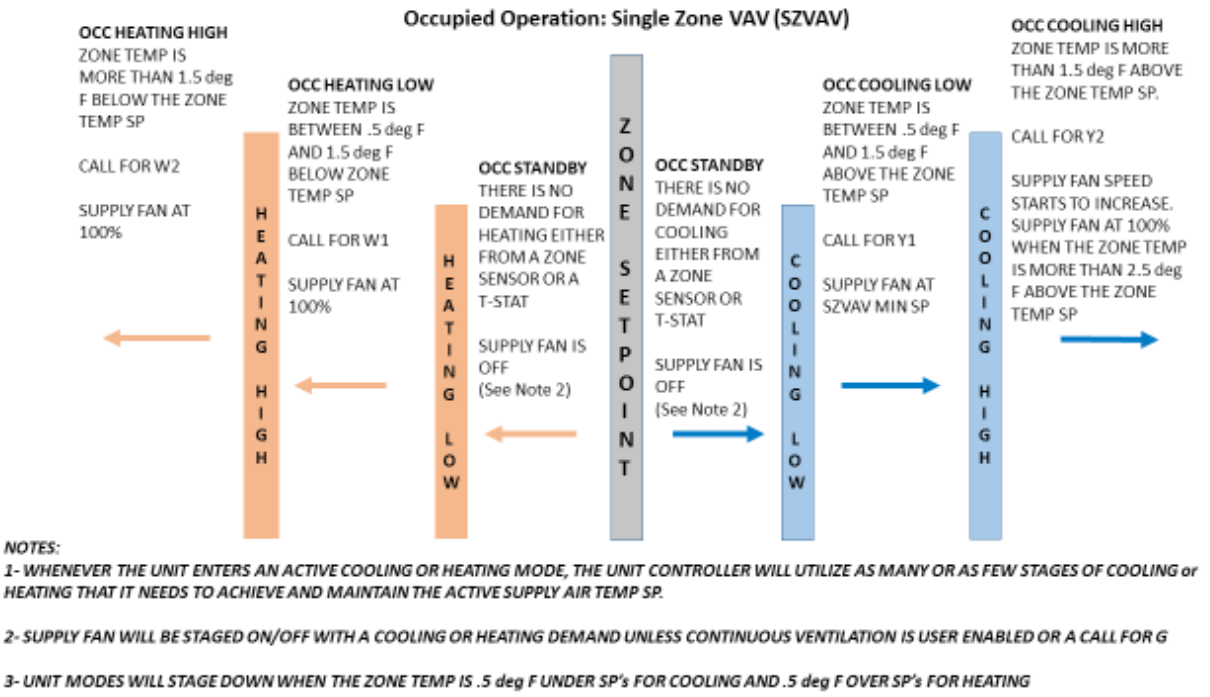


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FIGURE 38 - OCCUPIED OPERATION - SINGLE ZONE VAV (SZVAV)

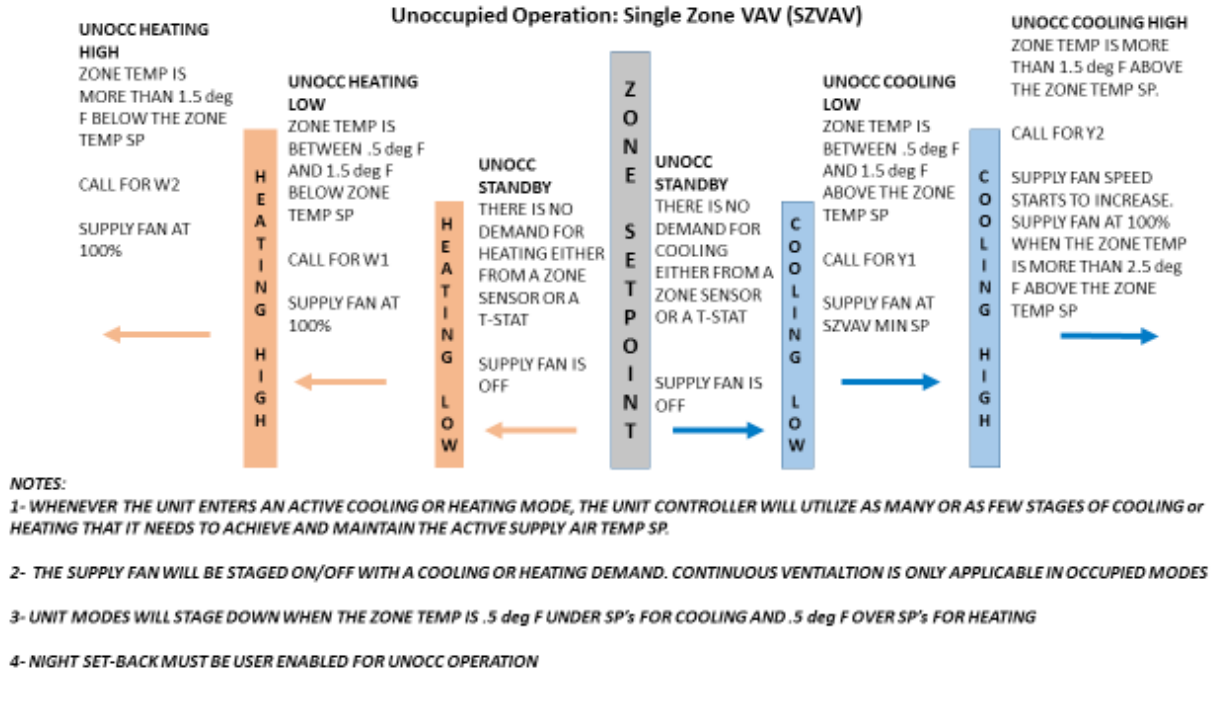

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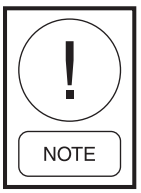
FIGURE 39 - UNOCCUPIED OPERATION - SINGLE ZONE VAV (SZVAV)

COMPRESSOR CONTROL



Compressor operation per system will have a fixed* "Mechanical Cooling Lockout Setpoint" *of 50.0°F with NO low ambient kit installed and an adjustable* "Mechanical Cooling Lockout Setpoint" *of 0.0–50.0°F with a low ambient kit installed.

Whenever a change in the unit cooling status is made:

- Compressor turned OFF, or
- Compressor turned ON,

a 3.5-minute Interstage Delay Timer is initiated. During these 3.5 minutes, no compressor can be started or stopped normally. A compressor will still be stopped immediately if a safety fault occurs.

- The unit enters an Active Cooling mode
- Unit Controller sets the *"COOLING CONTROL OFFSET"* to 2.0°F
- Unit Controller compares the SAT to the *"ACTIVE SAT"* setpoint plus or minus the *"COOLING CONTROL OFFSET"*
- If SAT is greater than the *"ACTIVE SAT"* setpoint plus the *"COOLING CONTROL OFFSET,"* Unit Controller will:
  a. Start a compressor

     OR

  b. Bring on an additional stage of cooling based on the *"NEXT STAGE TO ENABLE"*
- If SAT is less than the *"ACTIVE SAT"* setpoint minus the *"COOLING CONTROL OFFSET,"* Unit Controller will:
  a. Stop a compressor based on the *"NEXT STAGE TO DISABLE"*

See *Table 60–62 starting on page 172*.

Cooling Control Offset

- An internal calculation performed by the Unit Controller
- Looks at the difference between the SAT when a compressor is started and the SAT again 3.5 min utes later
- Helps to prevent over/undershooting of the SAT or MX SAT setpoints
- Helps to prevent short-cycling of compressors

Compressor Operation with Economizer

- When the OA conditions are suitable for economizer operation, the Unit Controller will set the *"COOLING CONTROL OFFSET"* to 4.5°F.
- The *"COOLING CONTROL OFFSET"* will remain at 4.5°F as long as the OA conditions are suitable and the economizer remains active

Economizer Becomes Active, No Compressors Are Operating

- Compressors will be started based on the *"NEXT STAGE TO ENABLE"* when ALL of the following are true:
  A. "ECONOMIZER CONTROL OUTPUT" must be greater than 95% for 30 sec
  b. SAT greater than or equal to *"ACTIVE SAT"* setpoint plus the *"COOLING CONTROL OFFSET"* (4.5°F)
  c. Interstage Delay Timer has expired
- Compressors will be stopped based on the *"NEXT STAGE TO DISABLE"* when ALL the following are true:
  A. "ECONOMIZER CONTROL OUTPUT" less than 5% for 30 sec
  b. SAT less than or equal to the *"ACTIVE SAT"* setpoint minus the *"COOLING CONTROL OFFSET"* (4.5°F)
  c. Interstage Delay Timer has expired

Economizer Becomes Active, One or More Compressors Operating

A compressor will be staged OFF, and then the sequence above will be utilized

Compressor Staging

The unit has three completely separate refrigeration circuits. There are two scroll compressors per circuit, for a total of six scroll compressors. This revision of the rooftop unit utilizes a new program for the staging up and down of the compressors. Each unit can have up to 14 stages of cooling operation. This is accomplished by using compressors of varying sizes and cycling them on/off dependent on the cooling load.

See *Tables 60–62 starting on page 172* for the compressor staging sequences.

Fast Compressor Start

The unit can utilize a Fast Compressor Start to shorten the length of time it takes the unit to stage on compressors. The Fast Comp Start allows the Unit Controller to go directly to a certain stage of cooling instead of staging on one at a time and then waiting for the 3.5 min Interstage Delay Timer to expire between starting compressors, which could take up to 50 mins to have all compressors operating.

Compressor Staging Logic

The compressor staging logic utilizes many different factors to determine the available compressors.

- Unit Size
- Compressor System Status (Normal or Faulted)

Current Stage

- Unit enters an Active Cooling mode
- Unit Controller will determine appropriate compressors to start based on the following:
  a. Internal programming logic

     AND

  b. Status of Fast Compressor Start
     1. USER ENABLED
     2. USER DISABLED

Economizer Available

- Unit enters an Active Cooling mode, and before any compressor is started, the *"CURRENT STAGE"* shall be set to 0
- If *"ECON AVAILABLE"* is YES, and the conditions determine that compressors are needed, Unit Controller will start the compressors that are needed for "Stage 1" and set the *"CURRENT STAGE"* to 1
- Staging up/down from this point will be in a sequential manner (Step 1, 2, 3, 2, 1 etc.)
- *"CURRENT STAGE"* will be recorded each time the controller stages Up/Down

Economizer Not Available and Fast Compressor Start Disabled

- Unit enters an Active Cooling mode
- Unit Controller will set the next stage to 1, and the compressors will be started/stopped sequentially
- Fourteen stages

Economizer Not Available and Fast Compressor Start Enabled

- Unit enters an Active Cooling mode
- Unit Controller will determine the cooling stage needed for the initial cooling demand
- Unit Controller will bring on the appropriate compressors needed for the initial cooling demand
- There will be a 10 sec delay between compressors starting for the initial cooling demand
- Once all the appropriate compressors have been started for the initial cooling demand, the Unit Controller will:
  a. Wait 3.5 min
  b. Determine if more or less cooling is needed
  c. More Cooling: will start/stop the appropriate compressors for the next higher stage
  d. Less Cooling: will start/stop the appropriate compressors for the next lower stage

TABLE 29 - 120-TON CAPACITY

Comp Sys 1 Status	Comp Sys 2 Status	Comp Sys 3 Status	% Capcity	Steps Available
OK	OK	OK	100	14
Faulted	OK	OK	72	6
OK	Faulted	OK	72	6
OK	OK	Faulted	54	4
Faulted	Faulted	OK	45	2
Faulted	OK	Faulted	27	2
OK	Faulted	Faulted	27	2

TABLE 30 - 130-TON CAPACITY

Comp Sys 1 Status	Comp Sys 2 Status	Comp Sys 3 Status	% Capcity	Steps Available
OK	OK	OK	100	14
Faulted	OK	OK	76	6
OK	Faulted	OK	64	6
OK	OK	Faulted	60	4
Faulted	Faulted	OK	40	2
Faulted	OK	Faulted	36	2
OK	Faulted	Faulted	24	2

TABLE 31 - 150-TON CAPACITY

Comp Sys 1 Status	Comp Sys 2 Status	Comp Sys 3 Status	% Capcity	Steps Available
OK	OK	OK	100	14
Faulted	OK	OK	77	6
OK	Faulted	OK	70	6
OK	OK	Faulted	52	4
Faulted	Faulted	OK	47	2
Faulted	OK	Faulted	29	2
OK	Faulted	Faulted	22	2

For Complete Compressor Staging Tables please refer to *Tables 60 through 62 starting on page 172.*

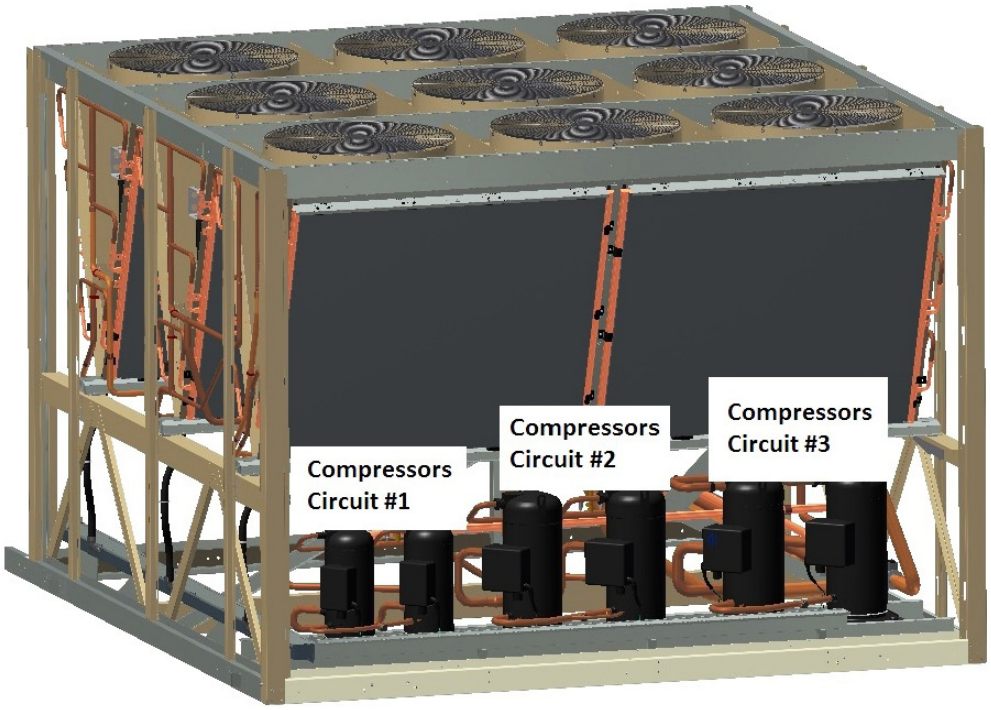


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FIGURE 40 - REFRIGERANT CIRCUIT IDENTIFICATION

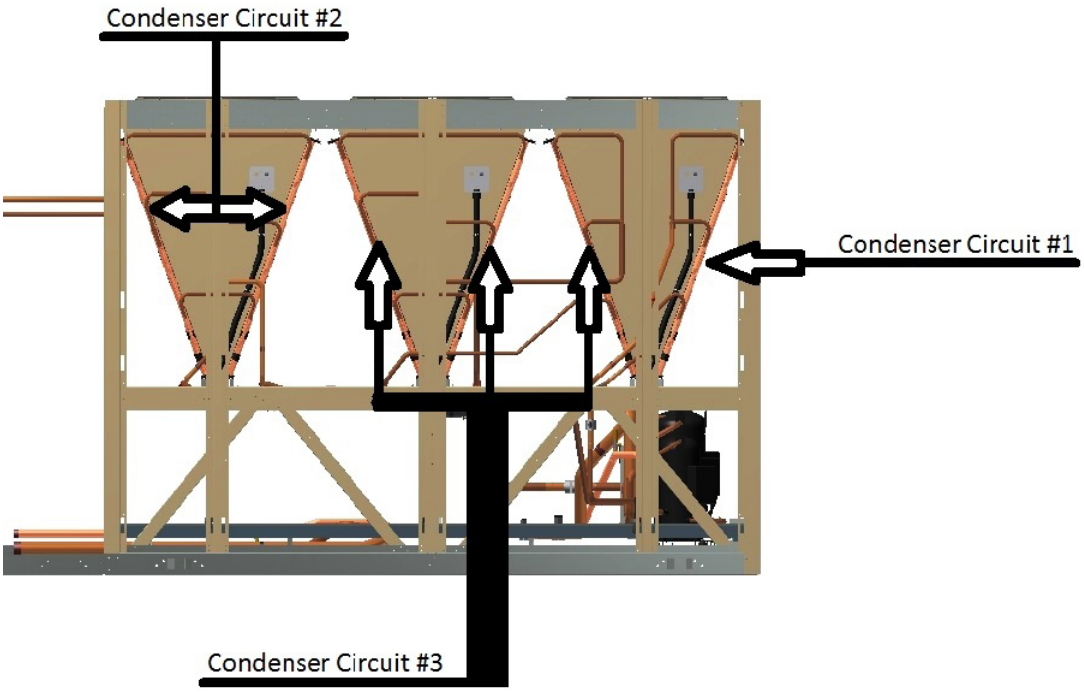

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FIGURE 41 - CONDENSER COIL IDENTIFICATION

Changing Staging Sequences

- During an Active Cooling mode, certain conditions could cause the Unit Controller to change the current staging method
  a. One or more compressor systems develop a Fault condition
  b. Comp System Fault condition is cleared
  c. Economizer goes active/inactive
  d. When this occurs, the Unit Controller will determine the proper compressor stage for the conditions
- When changing staging sequences the Unit Controller will:
  a. Temporarily stop the *"COOLING CONTROL OFFSET"* calculation
  b. Hold the current *"COOLING CONTROL OFFSET"* value
  c. Wait until the staging sequence has completed
  d. Wait until 3.5 min has expired
  e. Resume normal operation based on the new staging sequence

COMPRESSOR STATUS AND RUN DATA

Compressor Run Data

- The Unit Controller will monitor the compressor starts and compressor run hours
- This data will be stored under the OPERATING HOURS/START COUNTER key
- Operating hours/start counts cannot be reset

Compressor Status

- Each compressor circuit will have a high and low pressure switch
- Each compressor will have a manual reset O/L relay, as well as a compressor protection module
- The Unit Controller will monitor several different parameters to determine a compressor circuit status
  - *"HIGH DP UNLOAD"*
  - *"LOW AMB INHIBIT"*
  - *"LOW SUCT TEMP UNL"*
  - *"COMPR # SAFETY TRIP"*
  - *"COMPR # SAFETY FAULT"*
  - *"COMPR # SAFETY LOCKOUT"*

- If ALL the above parameters are False, a compressor will be placed in a "Ready to Run State"
- Once a compressor is started, after the 3.5 min "Minimum On Timer" has expired, the Unit Controller will change a compressor status to "Ready to Stop State"

Compressor Safety Circuit

- The Unit Controller will monitor the Compressor Safety Circuit for each compressor system
- The Compressor Safety Circuit will include the following:
  - Compressor solid state motor protector
  - Compressor overload (circuit breaker or manual motor starter)
  - High pressure switch
- Each compressor circuit also has a low pressure switch and suction line temp sensor. They are **NOT** a component of the Compressor Safety Circuit but are still monitored and are part of determining a compressor's status

Compressor Safety Circuit: Safety Trips and Safety Lockouts

- The components in the Compressor Safety Circuit are wired in series
- When all safeties are closed, there will be a 24 VAC input to the I/O board
- If any of the components open while a compressor is operating, both compressors in that circuit will be stopped (The 24 VAC input will be lost)
- The Unit Controller then monitors the time it takes for the open safety to reset and close (24 VAC input will be re-established)
- The time to reset (re-establish 24 VAC input) will be recorded in the History Buffer and identified as the *"COMP STATUS # CLEAR TIME"*
  - Compressor solid state motor protector: typically 30 min to clear
  - High pressure switch: typically less than 1 min
  - Compressor overload: requires a manual reset
- If the reset time is greater than 60 min, *"COMP STATUS # CLEAR TIME"* will be changed to *"COMP SYSTEM # TIME OUT"*

Compressor System Safety Trip

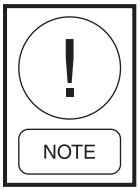
- Safety circuit input is ignored when both compressors of any system are OFF
- If either or both compressors are ON, and the safety circuit opens, the Unit Controller will turn OFF the active compressors for that circuit
- Compressor system will be made active again when the safety circuit is closed
- If Compressor Safety Circuit opens, the following will occur:
  - A *"COMP SYS # STATUS–SAFETY TRIP"* will be stored in the HISTORY buffer
  - The first safety trip will display *"COMP # SAFETY TRIP 1"*
  - A second trip within 120 minutes, will display *"COMP # SAFETY TRIP 2"*
  - A third trip within 120 min will cause the compressor system to LOCKOUT. HISTORY buffer will display *"COMP SYS # SAFETY LOCKOUT"*
  - A manual reset will be required
  - If 120 min expires before a second or third safety circuit trip, the Safety Circuit Timer will be reset

Low Pressure Cutout

- Operation of the Low Pressure Cutout (LPCO) will be the same as the Compressor Safety Circuit except for:
  - The low pressure switch will be ignored during the first 45 sec once a compressor system starts
- The low press switch will be ignored when a comp system is inactive
- Safety trips and safety lockouts will follow the same logic as above
- HISTORY buffer displays
  - *"COMP # LPCO TRIP 1 OR 2"*
  - *"COMP SYS # STATUS SAFETY LOCKOUT"*

Resetting A Compressor Lockout

- Leave the unit control switch ON
- Press the COMPRESSOR SYSTEMS key
- Use the ◄ or ► keys to find the compressor system with the LOCKOUT
- Use the ▲ or ▼ keys to find the screen that displays *"COMP SYS STATE LOCKOUT"*
- Press the OPTIONS key, then enter the password, 9725, then press the ✓ key again
- Screen will now display the following:
  - *"OPTIONS–COMP SYS # ✓TO EDIT"*
  - *"COMP SYS # STATE LOCKOUT"*
- Press the ✓ key and then use the ◄ or ► keys to change from LOCKOUT to RUN
- The Compressor System Lockout has now been cleared



If the state immediately reverts back to LOCKOUT, there is still an open safety in the Compressor Safety Circuit or the low pressure cutout

Suction Temperature Monitoring

- Whenever a compressor is operating, the Unit Controller will monitor the suction line temperature for the system
- If suction line temperature falls below suction low limit, 37.0°F for R-410A, for 10 sec, the Unit Controller will:
  1. Display the following
     a. STATUS screen: "Comp Sys # Status-Low Suct Temp Unload"
     b. COMPRESSOR SYSTEMS screen: "Status Low Suct Temp Unl"
     c. HISTORY screen: "Low Suct Temp # Trip"
  2. If both compressors were operating, Unit Controller will turn OFF the compressor with the longest run time
  3. Unit Controller will start a 60 sec timer
  4. After 60 sec, the Unit Controller will monitor the suction line temperature for the operating compressor
  5. If suction line temperature falls below suction low limit, 37.0°F for R-410A, the other compressor will be turned OFF
- This fault will be cleared for each compressor when the suction line temperature is greater than the suction low limit, 37.0°F for R-410A, plus 10.0°F for 10 min.

High Discharge Pressure Unloading

This feature allows the Unit Controller to shut down compressors before the discharge pressure reaches the *"HIGH PRESSURE CUT-OUT"* setpoint, thus providing reduced cooling for units that may have dirty condenser coils, overcharged systems, defective condenser fan motors, or the Outside Ambient Temp is higher than design conditions.

Sequence of Operation

- Unit MUST have discharge pressure transducers installed for this feature to operate
- *"SYSTEM UNLOADING PRESSURE"* MUST be set in the SETPOINTS key / COMPRESSOR SYSTEMS subsection
- Both compressors for a compressor system MUST be operating
- System discharge pressure greater than/equal to the *"SYSTEM UNLOADING PRESSURE"* setpoint for 10 sec
- Unit Controller will turn OFF the compressor with the fewest number of starts
- Unit Controller will record the OAT at time of shutting down compressor
- The *"HIGH DP UNLOAD"* will be cleared when:

a. The current OAT is less than the OAT at time of trip by at least 5.0°F

AND

b. The discharge pressure is less than the *"SYSTEM UNLOADING PRESSURE"*

Low Ambient Lockout

- The unit can operate mechanical cooling with an OAT as low as 50.0°F without a Low Ambient Package
- Mechanical cooling will be locked out below 0.0°F with a Low Ambient Package

CONDENSER FAN CONTROL

No Low Ambient Package Installed

The unit will have nine condenser fans installed, three per refrigerant circuit. The condenser fans will have a staging that is different than previous versions of the 120–150 ton rooftop unit. The three fans will be controlled in a staged manner.

Each refrigerant circuit will have suction and discharge pressure transducers standard, and cycling on/off of condenser fans is possible.

TABLE 32 - CONDENSER FAN STAGING: ONE COMPRESSOR ON PER SYSTEM

One Compressor ON:	System 1	System 2	System 3
One Fan ON	OAT less than 75.0°F	OAT less than 75.0°F	OAT less than 75.0°F
Two Fans ON	OAT is between 75.0 and 85.0°F	OAT is between 75.0 and 85.0°F	OAT is between 75.0 and 85.0°F
Three Fans ON	OAT is greater than 85.0°F	OAT is greater than 85.0°F	OAT is greater than 85.0°F

TABLE 33 - CONDENSER FAN STAGING: BOTH COMPRESSORS ON PER SYSTEM

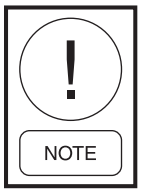
Two Compressors ON:	System 1	System 2	System 3
One Fan ON	OAT is less than 58.0°F	OAT is less than 58.0°F	OAT is less than 58.0°F
Two Fans ON	OAT is between 58 and 75.0°F	OAT is between 58 and 75.0°F	OAT is between 58 and 75.0°F
Three Fans ON	OAT is greater than 75.0°F	OAT is greater than 75.0°F	OAT is greater than 75.0°F

Condenser Fan Sequence

1. One fan ON: Middle condenser fan STARTS
2. Two fans ON: Middle fan stops, two outside fans START
3. Three fans ON: All three fans START

Condenser Fan Operation

- Whenever the first compressor is started in any refrigerant circuit, the appropriate number of fans will be started as per *Table 26 on page 83*
- After a 1 min delay, the Unit Controller will start to monitor the discharge pressure of the operating circuit
- Unit controller will cycle fans ON/OFF according to the *"COND FAN STAGE UP"* setpoint (350 psig) and *"COND FAN STAGE DOWN"* setpoint (265 psig)
- During times when OAT is between 50.0–75.0°F, one condenser fan could be cycled ON/OFF based on the *"COND FAN STAGE UP"* and *"COND FAN STAGE DOWN"* setpoints
- If the discharge pressure transducer readings become invalid, condenser fans will be cycled as per *Table 26 on page 83*



Mechanical Cooling Lockout will be fixed at 50.0° F with no low ambient package

Low Ambient Package Installed

- Condenser fan operation will be same as above except the middle condenser fan will be controlled by a VFD
- The Condenser Fan VFD will be wired in parallel with the discharge pressure transducer.

NOTE

Mechanical Cooling Lockout will be adjustable between 0–50.0°F with Low Ambient Package installed.

NOTE

Compressor operation per system will have a fixed* "Mechanical Cooling Lockout" *setpoint of 50.0° F with NO low ambient kit installed and an adjustable* "Mechanical Cooling Lockout" *setpoint of 0.0–50.0° F with a low ambient kit installed.

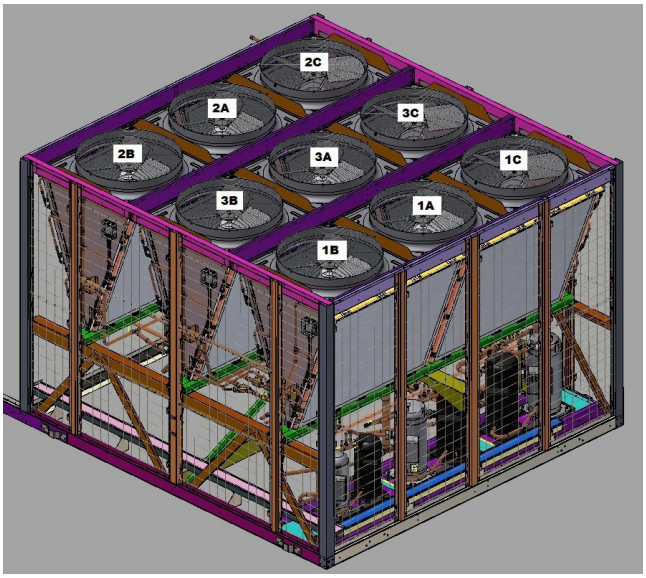


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FIGURE 42 - CONDENSER FANS

ECONOMIZER

NOTE

For proper operation of the economizer, the* "DAMPER HARDWARE" *selection under the VENTILATION key must be set to either* "STANDARD" *or* "TEK-AIR FULL IAQ." *If ventilation is not required, please set* "VENTILATION SYSTEM" *to* "USER DISABLED" *in the PROGRAM key / VENTILATION subsection. If* "DAMPER HARDWARE" *is set to* "NONE" *or* "2 POSITION," *the economizer will not operate.

The unit can be ordered with an optional factory-installed economizer. An economizer will provide "free cooling" during times when the OAT is too cold for mechanical cooling. The economizer sequence is a completely different sequence than ventilation even though both use the OA damper. The unit must be in Active Cooling mode for the economizer to become active.

There are three economizer types:

- **Dry Bulb:** Economizer suitability determined by OAT only
- **Single Enthalpy:** Economizer suitability determined by OAT and OA relative humidity
- **Dual Enthalpy:** Economizer suitability determined by comparing the OAT and OA relative humidity against the RAT and RA relative humidity

Dry Bulb

Sequence of Operation

- *"ECONOMIZER TYPE"* is DRY BULB
- Economizer is USER ENABLED
- Unit Controller must see a valid OAT
- If current OAT is 2.0°F less than *"OA DRY BULB"* setpoint, economizer will become active
- Unit Controller will modulate OA damper to try to achieve and maintain *"ACTIVE COOLING SAT"* setpoint

Single Enthalpy

Sequence of Operation

- *"ECONOMIZER TYPE"* is SINGLE ENTHALPY
- Economizer is USER ENABLED
- Unit Controller must see a valid OAT and OA relative humidity
- Economizer will become active if:
  - Current OAT is 2.0°F less than *"OA DRY BULB"* setpoint

    AND
  - Current OA Enthalpy is less than *"OA ENTHALPY"* setpoint
- Unit Controller will modulate OA damper to try to achieve and maintain *"ACTIVE COOLING SAT"* setpoint

Dual Enthalpy

Sequence of Operation

- *"ECONOMIZER TYPE"* is DUAL ENTHALPY
- Economizer is USER ENABLED
- Unit Controller must see a valid OAT, OA relative humidity, RAT, and RA relative humidity
- Economizer will become active if:
  - Current OAT is 2.0°F less than *"OA DRY BULB"* setpoint

    AND
  - Current OA Enthalpy is 1 btu/lb less than *"RA ENTHALPY"* setpoint
- Unit Controller will modulate OA damper to try to achieve and maintain *"ACTIVE COOLING SAT"* setpoint

Best Method

- Unit Controller gives option to set *"ECONO METHOD TO USE"* to BEST METHOD
- When set to BEST METHOD, the Unit Controller will monitor different sensors used for the three different economizer types, and if a sensor reading becomes invalid, the economizer method used will switch to a different method
- Example:

  If the *"ECONOMIZER TYPE"* is DUAL ENTHALPY and the RA humidity sensor reading becomes invalid, the Unit Controller will try to control the economizer as Single Enthalpy if *"ECONO METHOD TO USE"* is set to BEST METHOD

Economizer Operation (VAV)

- When conditions are determined suitable for Econo Operation, the Unit Controller will send a 0–10 VDC signal to the OA damper actuator, modulating the dampers open/closed
- OA dampers will be modulated to maintain the *"ACTIVE SAT"* setpoint

HEATING OPERATION

The unit can be ordered with different heating options. They are:

- None
- Electric Heat
- Staged Gas
- Modulating Gas
- Steam Heat
- Hot Water Heat

Electric Heat

- The following data must be entered
  a. Heating System MUST be USER ENABLED
  B. *"HEATING SYS TYPE"* MUST be set to ELECTRIC
  C. *"ELECT HEAT CAPACITY"* MUST be set to the nameplate capacity

SZVAV

- *"1ST AND 2ND STAGE HEATING"* setpoints must be entered

VAV

- *"HEATING SAT"* setpoint must be entered

Heating Control Offset (HCO)

- Unit Controller will calculate a *"HEATING CONTROL OFFSET"* based on the KW of heat installed, the CFM's, and the Stages of heat
- The *"HEATING CONTROL OFFSET"* will be rounded up to the nearest ½ degree.
- If *"HEATING CONTROL OFFSET"* is calculated to be less than 2.0°F, it will be set to 2.0°F
- If Unit mode is *"COMFORT VENT HEATING"* or *"SUPPLY AIR TEMPERING,"* the *"HEATING CONTROL OFFSET"* will be fixed at 5.0°F

TABLE 34 - ELECTRIC HEAT CAPACITY STAGES

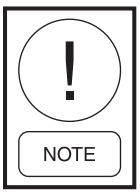
ELEC HEAT CAPACITY (KW)	MAXIMUM STAGES
80	3
108	3
150	4
200	6
250	7

Active SAT Setpoint

- VAV will utilize the *"HEATING SAT"* setpoint
- SZVAV will utilize the *"ACTIVE SAT"* setpoint based on *Table 21 on page 62*

Sequence of Operation

- Unit Controller enters an Active Heating mode
  a. Occ Heating
  b. Unocc Heating
  c. Comfort Vent Heating
  d. Supply Air Tempering
  e. Morning Warm-Up
- Unit Controller will determine the initial stages of heat needed
- Unit Controller will start the required stages of heat



"COMFORT VENT HEATING" ***and*** **"SUPPLY AIR TEMPERING"** ***will bring on one stage at a time***

- After expiration of the 3.5-minute Interstage Delay Timer, the Unit Controller will cycle ON/OFF stages of heat based on the Heating Control Logic

Staged Gas Heat

- The following data must be entered
  a. Heating System MUST be USER ENABLED
  B. "HEATING SYS TYPE" MUST be set to STAGED GAS
  C. "STAGED GAS HEAT CAPACITY" MUST be set to the nameplate capacity
  d. Heat limit temperature MUST be programmed
- The unit can have either 1, 2, or 3 gas burner sections
- Each section will consist of one two-stage gas valve, one ignition control, one induced draft motor, and high limit and rollout switches independent of the other burner sections
- The gas heat sections operation will be monitored by the Digital Multi-Plexor
- The Digital Multi-Plexor will receive a 24 VAC status input from each ignition control
- The Digital Multi-Plexor will convert the 24 VAC status input to a 0–5 VDC output signal to the Unit Controller, based on the operational status of each burner section
- Unit Controller monitors the time it takes to go between stages of operation and the specified operation state. The following states will be shown under the HEATING key, FURNACE # MODE:
  a. PURGE
  b. TRY FOR IGNITION
  c. ON-LOW
  d. ON-HIGH
  e. SAFETY TRIP
  f. SAFETY FAULT
  g. SAFETY LOCKOUT
  h. FAULT-LOCKOUT

SZVAV

- *"1ST AND 2ND STAGE HEATING"* setpoints must be entered

VAV

- *"HEATING SAT"* setpoint must be entered

Heating Control Offset (HCO)

- Unit Controller will calculate the *"HEATING CONTROL OFFSET"* based on the minimum firing rate, the CFMs, and the required temperature rise across the heat exchangers
- The *"HEATING CONTROL OFFSET"* will be rounded up to the nearest ½ degree.
- If *"HEATING CONTROL OFFSET"* is calculated to be less than 2.0°F, it will be set to 2.0°F
- If Unit mode is *"COMFORT VENT HEATING"* or *"SUPPLY AIR TEMPERING,"* the *"HEATING CONTROL OFFSET"* will be fixed at 5.0°F

TABLE 35 - GAS HEAT CAPACITY STAGES

GAS HEAT CAPACITY (MBH)	MAXIMUM STAGES
1125	6

Active SAT Setpoint

- VAV will utilize the *"HEATING SAT"* setpoint
- SZVAV will utilize the *"ACTIVE SAT"* setpoint based on *Table 21 on page 62*

Heating Control

- The Unit Controller will use the current SAT to determine when to cycle additional stages of heat ON/OFF

- If SAT is less than the SAT setpoint minus the HCO, an additional stage of heat will be started
- If SAT is greater than the SAT SP plus the HCO, an additional stage of heat will be stopped
- If SAT plus 2 times the HCO is more than/equal to the heat limit temperature, additional stages of heat will be prevented from starting

Sequence of Operation

- Unit Controller enters an Active Heating Mode
  a. Occ Heating
  b. Unocc Heating
  c. Comfort Vent Heating
  d. Supply Air Tempering
  e. Morning Warm-Up
- Unit Controller will determine the initial stages of heat needed
- Unit Controller will start the required stages of gas heat

NOTE

"COMFORT VENT HEATING" ***and*** **"SUPPLY AIR TEMPERING"** ***will bring on one stage at a time***

- After expiration of the 3.5-minute Interstage Delay Timer, the Unit Controller will cycle ON/OFF stages of heat based on the Heating Control Logic
- Each burner section will follow the same ignition sequence
  - Ignition Control (Furnace 1 starts first) receives a 24 VAC input from Unit Controller
  - Ignition Control closes internal contacts which start the Induced Draft Motor
  - Induced Draft Motor comes up to speed which closes pressure switch
  - 24 VAC runs through pressure switch and two limit switches
  - After a 30-second Purge delay, Ignition Control simultaneously produces a high voltage spark and outputs 24 VAC to the Lo Fire solenoid of gas valve for 7 seconds
  - Ignition Control monitors flame rectification signal. If the signal is present for 15 seconds, 24 VAC is sent to the appropriate terminal of the Digital Multi-Plexor. The multiplexor will then send a 0–5 VDC signal to the Unit Controller confirming operation
  - Burner #1 will now be in Low Fire. If Unit Controller determines more heat is needed, 24 VAC will be sent to High Fire solenoid of the gas valve.
  - If more heat is needed and there are the appropriate burner sections, they will follow the above sequence
  - If flame rectification is not present, Ignition Control turns off high voltage and 24 VAC to gas valve, waits 30 seconds, then restarts the ignition sequence
  - Ignition sequence will be tried three times. If successful ignition is not established after three attempts, the burner section will be locked out for one hour, or until the 24 VAC input to Ignition Control is removed

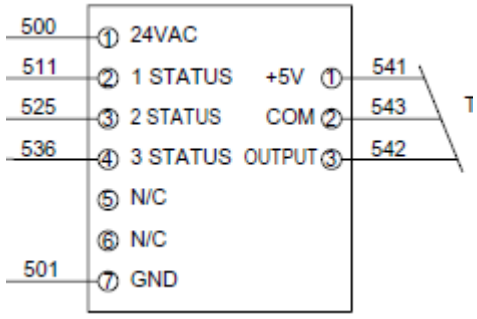
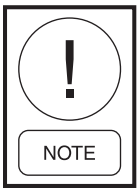


FIGURE 43 - DIGITAL MULTIPLEXOR CONNECTIONS - STAGED GAS HEAT

Modulating Gas Heat

- The following data MUST be entered
  a. Heating System MUST be USER ENABLED
  B. "HEATING SYS TYPE" MUST be set to MODULATING GAS HEAT
  C. "MODULATING GAS HEAT CAPACITY" MUST be set to the nameplate capacity
- The unit can have either 1, 2, or 3 gas burner sections

- Unlike Staged Gas, furnace section 1 will be split into two halves
  1. Right-hand side will be modulating (1A) and will have the following:
     a. Two staged gas valve
     b. Modulating gas valve
     c. Ignition Control
     d. Limit and roll out switches
  2. Left-hand side will be staged (1B) and will have the following
     a. Two staged gas valve
     b. Ignition Control
     c. Limit and roll out switches
- Furnace section 1 will have a shared 2 speed induced draft motor
- Modulating half (1A) of furnace section 1 will ALWAYS be first ON and last OFF (unless a fault exists)
- Staged half (1B) of furnace section 1 will ALWAYS be last ON and first OFF (unless a fault exists)



A fault on 1A will also cause 1B to be in a fault condition

- Burner sections 2 and 3 will have a 2 stage gas valve, single speed induced draft motor
- All furnace sections will have high limit and roll out switches independent of each other
- The gas heat sections operation will be monitored by the Digital Multi-Plexor
- The Digital Multi-Plexor will receive a 24 VAC status input from each ignition control.
- The Digital Multi-Plexor will convert the 24 VAC status input to a 0–5 VDC output signal to the Unit Controller, based on the operational status of each burner section
- Furnace # mode will be the same as Staged Gas
  a. PURGE
  b. TRY FOR IGNITION
  c. ON-LOW
  d. ON-HIGH
  e. SAFETY TRIP
  f. SAFETY FAULT
  g. SAFETY LOCKOUT
  h. FAULT-LOCKOUT

SZVAV

- *"1ST AND 2ND STAGE HEATING"* setpoints must be entered

VAV

- *"HEATING SAT"* setpoint must be entered

Heating Control Offset

- Fixed at 1.5°F for Modulating Gas Heat

Active SAT Setpoint

- VAV will utilize the *"HEATING SAT"* setpoint
- SZVAV will utilize the *"ACTIVE SAT"* setpoint based on *Table 21 on page 62*

Heating Control

- The Unit Controller will use the current SAT to determine when to cycle additional stages of heat ON/OFF
- If SAT is less than the SAT setpoint minus the HCO, the heating system will be in the Increase mode
- If SAT is greater than the SAT setpoint plus the HCO, the heating system will be in Decrease mode

Sequence of Operation

- Ignition Control (Furnace 1A starts first) receives a 24 VAC input from Unit Controller
- At the same time, Unit Controller sends 24 VAC signal to 6R (High Fire Relay) to place Induced Draft Motor on High Speed and Gas Valve in High Fire
- Induced Draft Motor comes up to speed and both low and high pressure switches close

- After a 30-second Purge delay, Ignition Control will:
  - Produce a high voltage spark for 7 sec
  - Send 24 VAC to Low and High Fire Solenoids of the gas valve
  - Modulate the mod gas valve to Min High Fire
- Ignition Controls checks for flame rectification. If present for 15 seconds:
  - Ignition Control sends a 24 VAC signal to Digital Multi-Plexor
  - Multi-Plexor sends a 0–5 VDC to Unit Controller
  - Unit Controller removes 24 VAC from 6R, which switches Inducer to Low Speed and mod gas valve to Low Fire
  - Mod gas valve is modulated to Min Low Fire
- Furnace 1A is now in Modulation mode
- If flame rectification is not present, Ignition Control and Unit Control will remove signals for heating operation, wait 30 seconds, then restart the ignition sequence
- Ignition sequence will be tried three times. If successful ignition is not established after three attempts, the burner section will be locked out for one hour or until the 24 VAC input to Ignition Control is removed
- Furnace sections 2, 3, and 1B will follow same firing sequence as Staged Gas

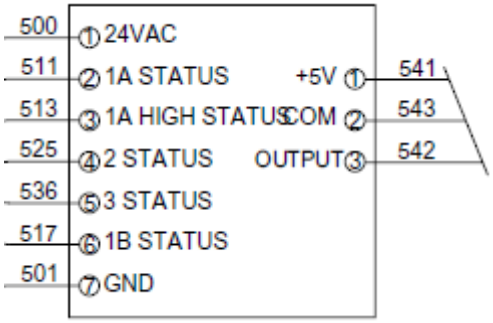


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FIGURE 44 - DIGITAL MULTIPLEXOR CONNECTIONS - MODULATING GAS HEAT

- The mod gas valve will be controlled by a Maxitrol Signal Conditioner. The Signal Conditioner can accept either a 4–20 mA or a 0–10 VDC signal. The signal is determined by a set of three dip switches. The 120–150 ton rooftop unit utilizes the 0–10 VDC signal
  - 4–20 mA: All three dip switches ON
  - 0–10 VDC: All three dip switches OFF
- The Signal Conditioner is powered by 24 VAC. The Signal Conditioner will receive a 0–10 VDC signal from the I/O board (TB9 terminals 9 and 10) and convert that to a 0–20 VDC signal to the modulating gas valve
- Once 1A is in Modulation mode, it will modulate from Low Fire to High Fire depending on the demand for heat
- When 1A is in Low Fire, the Low Fire Solenoid will be powered and the modulating gas valve will modulate from Low to High
- When 1A is in High Fire, the High Fire Solenoid will be powered and the modulating gas valve will modulate from Low to High

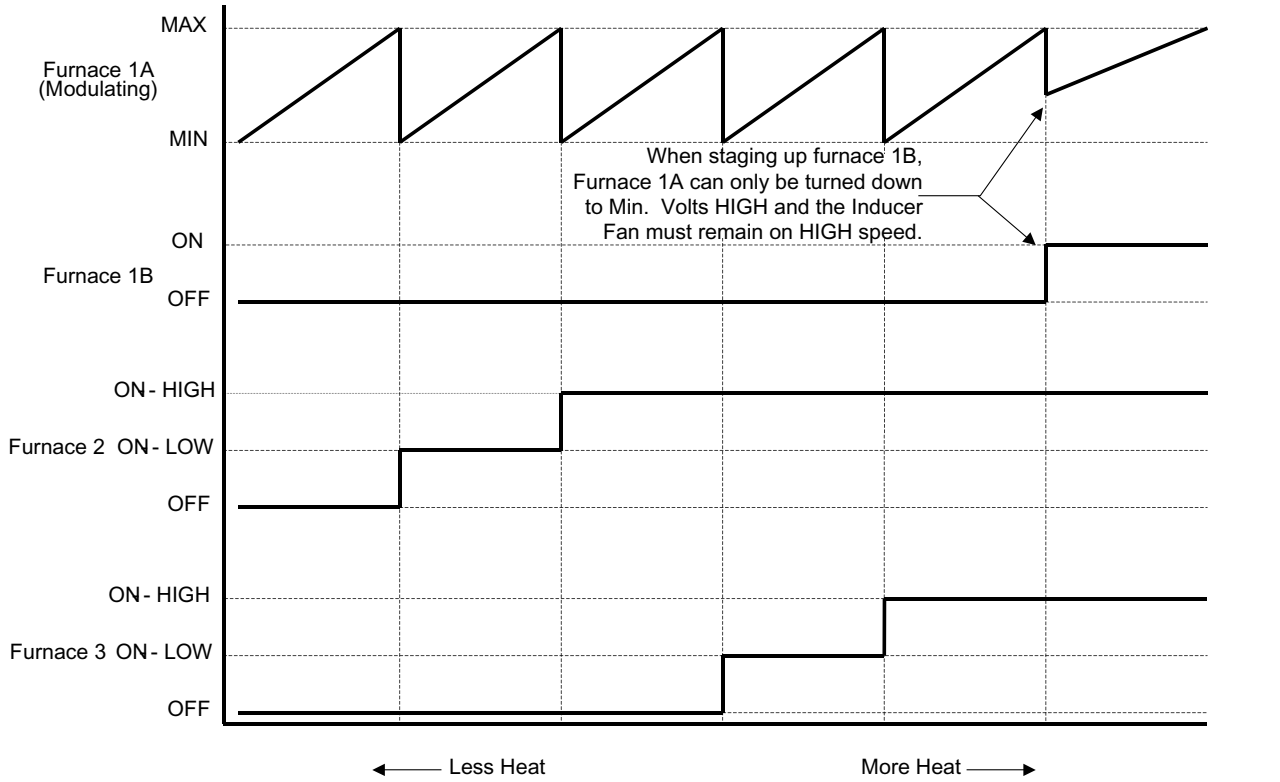

FIGURE 45 - MODULATING GAS HEAT STAGING SEQUENCE

- When staging UP, 1A must be in High Fire High, mod gas valve at maximum, staged valve on High Fire, before the next stage can be started
- When staging DOWN, 1A must be in Low Fire Low, mod gas valve at minimum, staged valve on Low Fire , before the next stage can be stopped
- 1A in High Fire High, and Unit Controller has demand for more heat:
  - 1A drop to Low Fire Low
  - Next available stage is brought on: 2, 3, or 1B
  - Stages 2 or 3 will start on Low Fire
  - 1A will modulate from Low Fire Low to High Fire High
  - If still more heat needed:
    - 1A modulates to Low Fire Low
    - Stage 2 or 3 goes to High Fire
    - 1A will again modulate from Low Fire Low to High Fire High
    - This same sequence will be used until 1B is needed
- 1B will always start on High Fire

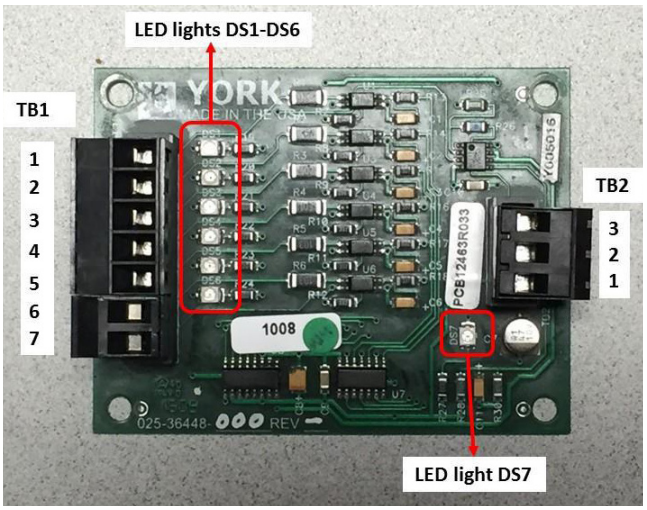

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FIGURE 46 - GAS HEATING FURNACE MULTI-PLEXER BOARD (STAGED AND MODULATING GAS HEAT)

Gas Heating Furnace Multi-Plexer Board

The Gas Heating Furnace Multi-Plexer Board uses 24 VAC inputs from the different furnace sections in a Series 100 unit with the IPU Controller and converts the 24 VAC inputs to a 0–5 VDC output. The 0–5 VDC output is sent to the Unit Controller.

TB1 and LED Lights DS1–DS6

- TB1 is used for the 24 VAC inputs from the different sections in the Series 100 unit
- TB1 inputs on Staged Gas Heat:
  - TB1-1: 24 VAC input from T5 transformer (DS1 is lit)
  - TB1-2: 24 VAC input from Furnace 1, DS2 is lit (375 MBH heating capacity)
  - TB1-3: 24 VAC input from Furnace 2, DS3 is lit (750 MBH heating capacity)
  - TB1-4: 24 VAC input from Furnace 3, DS4 is lit (1125 heating capacity)
  - TB1-5: Not used on Staged Gas Heat
  - TB1-6: Not used on Staged Gas Heat
  - TB1-7: 24 VAC common from T5 transformer
- TB1 inputs on Modulating Gas Heat:
  - TB1-1: 24 VAC input from T5 transformer (DS1 is lit)
  - TB1-2: 24 VAC input from Furnace 1A, DS2 is lit (375 MBH heating capacity)
  - TB1-3: 24 VAC input from Furnace 1A High, DS3 is lit (375 MBH heating capacity)
  - TB1-4: 24 VAC input from Furnace 2, DS4 is lit (750 MBH heating capacity)
  - TB1-5: 24 VAC input from Furnace 3, DS5 is lit (1125 MBH heating capacity)
  - TB1-6: 24 VAC input from Furnace 1B, DS6 is lit (375, 750, or 1125 heating capacity)
  - TB1-7: 24 VAC common from T5 transformer
- The 24 VAC inputs are provided from the V1 terminals of the Ignition Controls except for the 1A High, which is provided when the PS2 pressure switch closes. PS2 pressure switch will close when the induced draft motor on furnace section 1 is on High Speed.
- 24 VAC must be present at TB1-1 and TB1-7 for the Multi-Plexer to function properly. DS1 LED is lit when 24 VAC is present at TB1-1 and TB1-7.

TB2 and LED Light DS7

- TB2 is used to output a 0–5 VDC signal back to the Unit Controller
- TB2 outputs on Staged Gas and Modulating Gas Heat:
  - TB2-1: 5 VDC power from Unit Controller
  - TB2-2: 5 VDC common to Unit Controller
  - TB2-3: 0–5 VDC signal back to Unit Controller
- 5 VDC must be present at TB2-1 and TB2-2 for the Multi-Plexer to function properly. DS7 LED is lit when 5 VDC is present at TB2-1 and TB2-2.
- If 5 VDC is not present at TB2-1 and TB2-2, neither DS1 nor DS7 will be lit

Troubleshooting the Multi-Plexer Board

- Ensure the Mutli-Plexer board has both 5 VDC power and 24 VAC power at the appropriate terminals. A quick check of this can be made by looking at the DS1 and DS7 LEDs. If both LEDs are lit, both power sources are present. If 5 VDC is not present, neither DS1 nor DS7 will be lit. If 5 VDC is present but 24 VAC is not, only DS7 will be lit.

- Multi-Plexer Warnings:
  - *"WRN-FURNACE MULTI-PLEXER FAULT"* (used if the unit has Modulating Gas Heat)
  - *"WRN-GAS FURNACE"* (used if the unit has Staged Gas Heat)
- Ensure the unit's heating capacity matches what is set under the HEATING key
  - On Modulating Gas Heat, Furnace 1 is divided into two halves, 1A and 1B. This correlates to one heating section, and the heating capacity is 375 MBH. 750 MBH will have furnace sections 1A, 1B, and 2. 1125 MBH will have furnace sections 1A, 1B, 2, and 3.
  - On Staged Gas Heat, 375 MBH will have furnace section 1. 750 MBH will have furnace sections 1 and 2. 1125 MBH will have furnace sections 1, 2, and 3.
- If a particular furnace section is lighting and one of the above warnings are present, check for the proper 24 VAC input at TB1 of the Multi-Plexer board. If the 24 VAC input is not present, check for loose or broken wires or loose connections.
- If the proper 24 VAC input is present at TB1, check for the proper 0–5 VDC output from TB2. If the proper 0–5 VDC output is present at TB2, check for 0–5 VDC signal at the Unit Controller.
- Refer to *Table 50 on page 161* for Staged Gas and Modulating Gas. These tables show the proper VDC readings the Unit Controller should expect to see for how many stages of heat are calling.

Hot Water/Steam Heat

- The following data MUST be entered
  a. Heating System MUST be USER ENABLED
  B. "HEATING SYS TYPE" MUST be set to HW/STEAM HEAT
  C. "HW VALVE ACTION" MUST be set to either DIRECT or REVERSE

SZVAV

- *"1ST AND 2ND STAGE HEATING"* setpoints must be entered

VAV

- *"HEATING SAT"* setpoint must be entered

Active SAT Setpoint

- VAV will utilize the *"HEATING SAT"* setpoint
- SZVAV will utilize the *"ACTIVE SAT"* setpoint based on *Table 21 on page 62*

Sequence of Operation

- SAT is less than *"HEATING SAT"* setpoint, valve will modulate open
- SAT is greater than *"HEATING SAT"* setpoint, valve will modulate closed

HW/Steam Valve Control

Unit Controller sends a 0–10 VDC signal to the HW/Steam valve as described below

- DIRECT: An increase in heating demand will cause the Unit Controller to increase the voltage signal to the valve
- REVERSE: An increase in heating demand will cause the Unit Controller to decrease the voltage signal to the valve

Freeze Protection

- Unit is not in an Active Heating mode
- Supply fan is ON
- Unit Controller will modulate the HW/Steam valve open if the SAT falls below 38.0°F

  OR

- Supply fan is OFF
- OAT drops below 40.0°F
- Unit Controller will send the appropriate signal to the valve
  - 100% if DIRECT
  - 0% if REVERSE

Freeze Fault

- Unit Controller monitors the status of the Freezestat
- Freezestat Open=Normal
- Freezestat Closed=Fault (Closes at 35.0°F)
- Freezestat closed for 10 seconds, Unit Controller will fully open HW/Steam valve

- 100% if DIRECT
- 0% if REVERSE

- Unit Controller starts a 5-minute Freeze Trip Timer
  - Freezestat opens during this period, unit resumes normal operation
- Freezestat remains closed after 5-minute timer expires, the Unit Controller will shut down the unit and display a *"LOCKOUT-HOT WATER FREEZE"*

Morning Warm-Up

Morning Warm-Up is a function that can be used for any unit type: SZVAV and VAV. The basic operation is the same for both setups.

Morning Warm-Up allows for the unit's heating medium to be used to bring the controlled space to a comfortable temperature before personnel arrive.

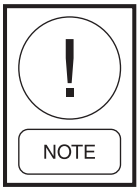
Morning Warm-Up can be initiated in one of three ways

1. A Morning Warm-Up command from the BAS
2. A command from the Unit Controller utilizing the internal programming schedule
3. 24 VAC input to W1 at CTB1 or a W1 command from the BAS

Morning Warm-Up Setup

- The unit must have a heating medium installed
- Morning Warm-Up must be USER ENABLED

Sequence of Operation



It is recommended that all VAV boxes are open to their maximum position during Morning Warm-Up operation.

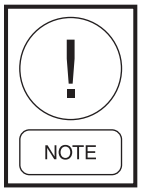
- The unit MUST be in an Unoccupied mode before Morning Warm-Up can be initiated
- The unit receives a Morning Warm-Up command
- The unit's supply fan will start. If a VAV system, the supply fan VFD will control to the "active duct static pressure" setpoint
- After 5 minutes, the Unit Controller will compare the RAT to the "RAT Heating" setpoint
- If the RAT is greater than or equal to the "RAT Heating" setpoint, the heating sequence will not be energized
- If the RAT is less than the "RAT Heating" setpoint by at least 1.0°F, the Unit Controller will start the unit's heating medium
- Once the heating medium is started, the "active SAT" setpoint will be as below
  1. VAV will control to the "Heating SAT"
  2. SZVAV will control to the "2nd Stage Heating" setpoint
- The heating medium will remain ON until:
  3. The RAT is greater than or equal to the "RAT Heating" setpoint plus 0.5°F

     OR

  4. The Morning Warm-Up command is removed

     OR

  5. The unit enters an OCC mode



Failure to remove the Morning Warm-Up command or the W1 input from the Unit Controller will cause the unit to immediately re-enter Morning Warm-Up once an UNOCC mode is entered.

Adaptive Morning Warm-Up

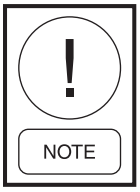
Adaptive Morning Warm-Up will only be utilized when the unit uses an internal programming schedule to determine OCC/UNOCC modes.

With Adaptive Morning Warm-Up, the Unit Controller will calculate the start time to ensure that the RAT is within 0.5°F of the *"RAT HEATING"* setpoint when the unit switches to an OCC mode. This is accomplished by calculating the Morning Warm-Up Optimal Start Time by averaging the amount of time it takes to bring the RAT within 0.5°F of the *"RAT HEATING"* setpoint for three consecutive days. The three warm-up times are averaged and added to a 10-minute offset. The new time is used as the Morn Warm-Up Opt Time for the next day.

Adaptive Morn Warm-Up Set-up

- *"OCCUPANCY SCHEDULE"* **MUST** be programmed for the OCC and UNOCC start and stop times. This is done through the SCHEDULE key
- *"OCCUPANCY SCHEDULE"* **MUST** be USER ENABLED
- Morning Warm-Up **MUST** be USER ENABLED
- Adapt Morning Warm-Up MUST be USER ENABLED
- *"RAT HEATING"* setpoint **MUST** be set
- *"MORN WARM-UP MAX TIME"* MUST be set
- If the *"MORN WARM-UP OPT TIME"* exceeds the *"MORN WARM-UP MAX TIME,"* the *"MORN WARM-UP OPT TIME"* will become the *"MORN WARM-UP MAX TIME"*
- If the *"MORN WARM-UP OPT TIME"* is determined to be less than 15 minutes, the *"MORN WARM-UP OPT TIME"* becomes 15 minutes
- The default values for *"DAILY WARM UP TIME [DAY 1], [DAY 2], AND [DAY 3]"* shall be initially set to 60 minutes. These values can be reset to the default values by turning the Morning Warm Up to USER DISABLED, then back to USER ENABLED

Sequence of Operation



It is recommended that all VAV boxes are open to their maximum position during Morning Warm-Up operation.

- The unit MUST be in an UNOCC mode before Morning Warm-Up can be initiated
- The Unit Controller starts the Morning Warm-Up sequence
- The supply fan starts. If VAV, the supply fan VFD will be controlled to the *"ACTIVE DUCT STATIC PRESSURE"* setpoint
- If the RAT is greater than the *"RAT HEATING"* setpoint minus 1.0°F, the Unit Controller will not energize the heating sequence and will set the Daily Warm Up Time to 5 minutes
- If the RAT is less than or equal to the *"RAT HEATING"* setpoint minus 1.0°F, the Unit Controller will energize the heating sequence based on the Morning Warm Up Optimal Start Time
- Once the heating medium is started, the *"ACTIVE SAT"* setpoint will be as below
  - VAV will control to the *"HEATING SAT"*
  - SZVAV will control to the *"2ND STAGE HEATING"* setpoint
- The heating medium will remain ON until:
  - The RAT is greater than or equal to the *"RAT HEATING"* setpoint plus 0.5°F

    OR
  - The Morning Warm-Up command is removed

    OR
  - The unit enters an OCC mode

Supply Air Tempering

Supply Air Tempering is a function that is utilized in VAV configured units only. Supply Air Tempering will bring on the unit's heating source to temper the supply air. It is typically used on units that have large requirements of outside ventilation air during the winter months.

When Supply Air Tempering is active, the unit's heating source will temper the SAT and try to maintain the *"CURRENT COOLING SAT"* setpoint

Sequence of Operation

- Heating System MUST be USER ENABLED
- Supply Air Tempering MUST be USER ENABLED
- Modulating Gas or HW/Steam
  - (VAV: *"OCC STANDBY"* or *"OCC COOLING"*) Current SAT is 2.5°F less than the *"ACTIVE SAT"* setpoint for 5 minutes
  - Economizer output is less than/equal to 5%
  - No compressor operation for 10 mins
- Staged Gas or Electric Heat
  - Same as above

    AND
  - Current Heat Entering Temp is 5.0°F less than the *"ACTIVE SAT"* setpoint for 5 mins

Supply Air Tempering Termination

- Modulating Gas Heat
  - (VAV: *"OCC STANDBY"* or *"OCC COOLING"*) Current SAT is 4.0°F greater than the *"ACTIVE COOLING SAT"* setpoint for 5 mins
  - Mod Gas Heat is at Min Low Fire
- HW/Steam
  - (VAV: *"OCC STANDBY"* or *"OCC COOLING"*) Current SAT is greater than the *"ACTIVE COOLING SAT"* setpoint
  - HW/Steam Valve position is less than/equal to 2%
- Staged Gas and Electric Heat
  - (VAV: *"OCC STANDBY"* or *"OCC COOLING"*) The current heat entering temperature is greater than the *"ACTIVE COOLING SAT"* setpoint for 5 minutes

VENTILATION

Ventilation is a function of bringing in a set amount of fresh outside air to a space. It is a separate function than an economizer, which is part of the Cooling mode.

Damper Hardware

Ventilation on the rooftop unit can be configured for one of four modes

1. None
2. 2-Position Damper
3. Standard Damper
4. TEK-Air Full IAQ

Control Options

There are two different control options for the Standard Damper and the TEK-Air:

1. Fixed Minimum
2. Demand Ventilation: requires the unit to have two CO_2 sensors, one indoor and one outdoor (used for a reference). When the indoor CO_2 level exceeds the outdoor CO_2 level by the *"CO_2 OFFSET"* setpoint, the O/A dampers will modulate open to lower the indoor CO_2 level.

Ventilation System Active

- The unit MUST be in an OCC mode (ventilation will be inactive in any UNOCC mode)
- The supply fan proving circuit MUST be CLOSED

NOTE

If the economizer becomes active, the economizer control logic can open the O/A dampers past the* "ACTIVE VENTILATION MINIMUM POSITION" *setpoint. The economizer cannot close the O/A dampers below the* "ACTIVE VENTILATION MINIMUM POSITION" *setpoint.

2 Position Damper

- Ventilation system **MUST** be USER ENABLED
- Damper hardware **MUST** be set to 2 POSITION

Sequence of Operation

- When the ventilation system is active, the Unit Controller will send a 10 VDC signal to the actuator
- When the ventilation system is inactive, the Unit Controller will remove the 10 VDC signal from the actuator
- The amount of outdoor air can be set by adjusting the damper linkages

Standard Damper

Standard dampers can be set for two control types

1. Fixed Minimum
2. Demand Ventilation

Standard Damper w/ Fixed Minimum Control

This function is sometimes known as “The poor man’s air measuring station.” The unit modulates the O/A dampers between a minimum and maximum position based on the speed of the supply fan VFD.

Fixed Minimum

- Ventilation system **MUST** be USER ENABLED
- Damper hardware **MUST** be set for STANDARD DAMPERS
- Ventilation control **MUST** be set for FIXED MINIMUM
- *"O/A DAMPER MIN POS"* and *"O/A DAMPER MAX POS"* MUST be set

Sequence of Operation

- Supply fan is ON
- Ventilation system is ACTIVE
- Economizer system is INACTIVE

NOTE

If the economizer becomes active, the economizer control logic can open the O/A dampers past the* "ACTIVE VENTILATION MINIMUM POSITION"** ***setpoint. The economizer cannot close the O/A dampers below the* "ACTIVE VENTILATION MINIMUM POSITION"** ***setpoint.

- Based on the Supply Fan VFD speed, the O/A dampers will modulate as follows:
  1. VFD at 100%, O/A dampers will be at the *"OA DAMPER MIN POS"*
  2. VFD at 50%: O/A dampers will be at the *"OA DAMPER MAX POS"*
  3. VFD between 100% and 50%: O/A dampers will modulate between the *"OA DAMP MIN"* and *"OA DAMP MAX"* positions

Standard Damper w/ Demand Ventilation

When the rooftop unit is configured for this option, the O/A dampers will modulate between a minimum and maximum position based on ventilation demand.

Demand Ventilation

- Ventilation system MUST be USER ENABLED
- Damper hardware MUST be set for STANDARD DAMPERS
- Ventilation control MUST be set for DEMAND VENTILATION
- *"O/A DAMPER MIN POS"* and *"O/A DAMPER MAX POS"* MUST be set
- *"CO_2 OFFSET"* setpoint MUST be set

Sequence of Operation

- Supply fan is ON
- Ventilation system is ACTIVE
- Economizer system is INACTIVE

NOTE

If the economizer becomes active, the economizer control logic can open the O/A dampers past the* "ACTIVE VENTILATION MINIMUM POSITION"** ***setpoint. The economizer cannot close the O/A dampers below the* "ACTIVE VENTILATION MINIMUM POSITION"** ***setpoint.

- Based on ventilation demand, the O/A dampers will modulate as follows
  1. Ventilation at 0%: O/A dampers will be at the *"OA DAMP MIN POS"*
  2. Ventilation demand at 100%: O/A dampers will be at the *"OA DAMP MAX POS"*
  3. Ventilation demand between 0–100%: O/A dampers will modulate between the *"OA DAMP MIN"* and *"OA DAMP MAX"* positions

TEK-Air Full IAQ (Air Measuring Station)

TEK-Air Full IAQ can be set for two control types

1. Fixed Minimum
2. Demand Ventilation

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FIGURE 47 - TEK-AIR PROBE AND TRANSDUCER

NOTE

The TEK-Air Full IAQ is sensitive to lower airflow velocities. It is possible that the display goes blank rather than displays a CFM if the outside air drops below the sensitivity of the airflow measuring station.

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FIGURE 48 - TEK-AIR MONITOR

TEK-Air Factory Set-Up

The TEK-Air station should come from the factory programmed for proper operation. The programming should be checked during start-up to ensure proper operation.

- Password: 1234

NOTE

Ventilation air should not be set below 1,500 CFM. When set lower than the suggested minimum airflow setpoint, the unit controller may not display a reliable CFM.

Area Of Flow Device: This is the area of flow in square feet.

- 120 and 130 ton: 30 sq ft
- 150 ton: 35 sq ft

Sensor Flow Coeff: This is the sensor flow coefficient for the type of differential pressure generating device being used. The rooftop unit uses an IAQ-TEK probe, which uses a value of 0.762.

Altitude: This is the altitude in feet above or below sea level for the location of the probe. The Unit Controller makes an altitude correction calculation; therefore, this parameter should always be set to 0 feet.

Low Flow Alarm STPT: This is the low flow alarm setpoint in CFM. This parameter should be set to 0 CFM.

Analog Out Flow STPT: This is the full-scale range in CFM for the analog output scaling. This parameter should be set to 46,000 CFM.

Alarm Delay Period: Several of the IAQ-TEK alarm conditions have their initiation inhibited for a delay period. This period is utilized to create a delay between the actual occurrence of the alarm and the reporting of the alarm at the display. This parameter should be set to 20 seconds.

Press Average INT: This is the averaging time for the average pressure calculation. The parameter should be set to 10 seconds.

Use Fan Interlock: The fan interlock is used to interlock the action of the monitor to the running of the fan. When this function is turned ON, the low CFM airflow alarm is deactivated any time the digital input function reports that the fan is off. This parameter should be set to ON.

Balancers ADJ Fact: This feature allows the application of an airflow correction factor based on a difference between the calculated airflow and the air balancers report. Default is 100%.

Password Change: This allows the password to be changed. The password is set to 1234.

Auto-Zero Interval: This parameter should be set to 30 minutes.

Encl Temp Set PT: The transducer has an internal heater to maintain a constant temperature in the transducer enclosure. This value is used in the operation of the heater. The parameter should be set to 120.0°F.

Outside Air Temp Sensor Bias: Allows the air balancer to adjust the monitor outside air temperature readings to those observed by the air balancer. The Unit Controller uses the outside air input for the outdoor air sensor. This parameter should always be set to 0.

Transducer Zero: This sets the monitor zero range in iwg. corresponding to the transducer 4mA output. This parameter should be set to 0.0 iwg.

Transducer FS: This sets the monitor full scale range in iwg corresponding to the transducer 20mA output. This parameter should be set to 0.25 iwg.

The TEK-Air station also has some built in diagnostic alarms.

The diagnostic alarms are used to provide diagnostic information on the performance of the product and to alert the user to possible malfunction. The following are descriptions of the diagnostic alarms that are available at the IAQ-TEK monitor.

Low Flow Alarm: The Low Flow Alarm is used to alert the building operators that the intake volume has fallen below the minimum acceptable level. The control compares the derived CFM value to the programmed *"LOW FLOW ALARM"* setpoint. The unit is shipped from the factory with a *"LOW FLOW ALARM"* setpoint of 0 CFM. Should the airflow remain below this value for longer than the programmed Alarm Delay Period of 20 seconds, the IAQ-TEK monitor will show a Low Flow Alarm. To reset to normal, the air volume must rise to a value that is 10% higher than the *"LOW FLOW ALARM"* setpoint. Once this threshold has been crossed, the alarm is reset automatically.

Reverse Flow Alarm: This is used to identify that the airflow is blowing out of the intake of the outdoor air. Should the airflow remain reversed for longer than the programmed Alarm Delay Period of 20 seconds, the IAQ-TEK monitor will show a Reverse Flow Alarm. In order to reset, the pressure input from the probe to the transducer must increase to zero or have a sign change to positive. Once the value has changed, the alarm is reset automatically.

Pressure Loss Alarm: The signal from the pressure transducer to the monitor indicates a negative pressure. The alarm will be initiated immediately without a delay period.

Outdoor Air Temperature Sensor Loss Alarm: Indicates the Outside Air Temperature input to the monitor went either high (input short) or low (input open). The alarm will be initiated immediately without a delay period.

Enclosure Temperature Loss: Indicates the Enclosure Temperature input to the monitor for the transducer went high (input short) or low (input open). The alarm will be initiated immediately without a delay period.

Loss of Enclosure Heater: Indicates the enclosure temperature fell 11.0°F below the *"ENCL TEMP"* setpoint. Should this remain low for longer than the programmed Alarm Delay Period of 20 seconds, the IAQ-TEK monitor will show a Loss of Enclosure Heater Alarm. If the temperature remains below for 1 hour, a heater malfunction will be initiated.

Auto-Zero Valve Malfunction: Indicates the pressure transducer's auto-zero valve malfunction. The alarm will be initiated immediately without a delay period.

Memory Loss Alarm: Indicates there has been a loss of nonvolatile memory parameters. The alarm will be initiated immediately without a delay period.

Checksum Error Alarm: Indicates there is a memory checksum error. The alarm will be initiated immediately without a delay period.

TEK-Air w/ Fixed Minimum

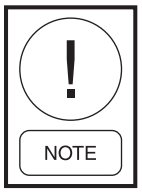
The rooftop unit will modulate the O/A dampers to maintain a set amount of outdoor air CFMs.

Fixed Minimum

- Ventilation system MUST be USER ENABLED
- Damper Hardware MUST be set for TEK-AIR FULL IAQ
- Ventilation control MUST be set for FIXED MINIMUM
- *"MINIMUM FLOW OA"* setpoint MUST be programmed

Sequence of Operation

- Supply Fan is ON
- Ventilation system is ACTIVE
- Economizer is INACTIVE



If the economizer becomes active, the economizer control logic can open the O/A dampers past the* "ACTIVE VENTILATION MINIMUM POSITION" *setpoint. The economizer cannot close the O/A dampers below the* "ACTIVE VENTILATION MINIMUM POSITION" *setpoint.

- Based on the programmed value for *"MINIMUM FLOW OA"* setpoint the O/A dampers will modulate open/closed to maintain the required amount of OA CFMs

TEK-Air w/ Demand Ventilation

- The unit modulates the O/A dampers to maintain a set amount of outdoor air CFMs
- If ventilation demand rises, the O/A dampers will modulate between the *"MINIMUM FLOW OA"* and *"MAXIMUM FLOW OA"* setpoints

Demand Ventilation

- Ventilation system MUST be USER ENABLED
- Damper Hardware MUST be set for TEK-AIR FULL IAQ
- Ventilation control MUST be set for DEMAND VENTILATION
- *"MINIMUM FLOW OA"* and *"MAXIMUM FLOW OA"* setpoints MUST be programmed

Sequence of Operation

- Supply Fan is ON
- Ventilation system is ACTIVE
- Economizer is INACTIVE

NOTE

If the economizer becomes active, the economizer control logic can open the O/A dampers past the* "ACTIVE VENTILATION MINIMUM POSITION"** ***setpoint. The economizer cannot close the O/A dampers below the* "ACTIVE VENTILATION MINIMUM POSITION"** ***setpoint.

- Based on the programmed value for *"MINIMUM FLOW OA"* setpoint, the O/A dampers will modulate open/closed to maintain the required amount of OA CFM
- If the ventilation demand starts to rise, the O/A dampers will modulate between the *"MINIMUM FLOW OA"* and *"MAXIMUM FLOW OA"* setpoints until the ventilation demand decreases to 0%

Comfort Ventilation

Comfort Ventilation is a sequence that is only applicable if the unit is configured for SZVAV. It is typically needed if the unit has a high amount of outside air used for ventilation or if CO_2 sensors are installed. Comfort Ventilation prevents the space from getting to cool/warm before a thermostat or zone sensor requests cooling or heating. It uses the Occ Zone Cooling or Occ Zone Heating SPs.

Sequence of Operation

- Unit MUST have heat installed and it MUST be USER ENABLED
- Comfort Ventilation must be USER ENABLED (PROGRAM key / VENTILATION subsection)
- Unit MUST be in an OCC mode

Comfort Vent Cool

- Enabled if current SAT is more than 5.0°F higher than *"OCC ZONE COOLING"* setpoint
- When in Comfort Vent Cool mode, *"ACTIVE SAT"* setpoint is equal to *"OCC ZONE COOLING"* setpoint
- Disabled if current SAT is more than 5.0°F lower than *"OCC ZONE COOLING"* setpoint for 5 mins

Comfort Vent Heat

- Enabled if current SAT is more than 5.0°F lower than the *"OCC ZONE HEATING"* setpoint
- When in Comfort Vent Heat mode, *"ACTIVE SAT"* setpoint is equal to *"OCC ZONE HEATING"* setpoint
- Disabled if current SAT is more than 5.0°F higher than *"OCC ZONE HEATING"* setpoint for 5 mins

Continuous Ventilation

Continuous Ventilation is a sequence that is only applicable if the unit is configured for SZVAV. It keeps the supply fan operating continuously while in the OCC mode. Continuous Ventilation must be USER ENABLED (ZVAV), which can be enabled with the PROGRAM key / VENTILATION subsection.

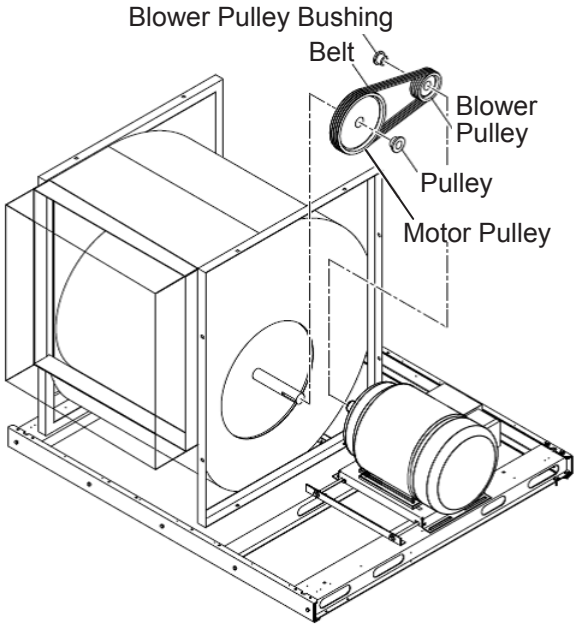


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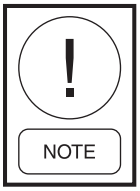
FIGURE 49 - EXHAUST FAN

5

EXHAUST

Exhaust is a function that allows the rooftop unit to maintain the building pressure. The exhaust system will control an exhaust fan and/or exhaust dampers. The exhaust system has NO control over the O/A dampers.



The rooftop unit can either have an exhaust fan or a return fan, but not both. An exhaust fan will have one 32" x 32" forward curved blower wheel with one motor. A return fan will have one 44" plenum fan wheel with one motor.

Exhaust System Options

- On/Off control based on building pressure (single speed exhaust fan, barometric damper)
- Modulating damper with fixed speed exhaust (single speed exhaust fan)
- Modulating exhaust fan with VFD (barometric exhaust damper)

On/Off Based on Building Pressure

- *"POWER EXHAUST TYPE"* MUST be set to ON-OFF PRESS CONTROL
- *"BUILDING PRESSURE ACTIVE"* setpoint MUST be programmed into Unit Controller
- *"BUILDING PRESS CNTRL OFFSET"* MUST be programmed into Unit Controller

Sequence of Operation

- When building static pressure is greater than/equal to the *"BUILDING PRESS"* setpoint plus the *"BLDG PRESSURE CNTL OFFSET,"* the exhaust fan will start
- When building static pressure is less than/equal to the *"BUILDING PRESS"* setpoint minus the *"BLDG PRESSURE CNTL OFFSET,"* the exhaust fan will stop

Modulating Damper w/ Fixed Speed Exhaust

- *"POWER EXHAUST TYPE"* MUST be set to MODULATED DAMPER–VFD
- *"BLDG PRESS"* setpoint MUST be programmed into Unit Controller
- *"EXHAUST OUTPUT FOR FAN START"* MUST be programmed into Unit Controller
- *"EXHAUST OUTPUT FOR FAN STOP"* MUST be programmed into Unit Controller

Sequence of Operation

- Building Press rises above the *"BLDG PRESS"* setpoint
- Unit Controller sends a 0–10 VDC signal to exhaust damper actuator. Unit Controller will display this signal as a %. 0 VDC = 0% and 10 VDC = 100% (% output is displayed as EXHAUST DAMPER POSITION)
- When the % output is equal to/greater than the *"EXHAUST OUTPUT FOR FAN START,"* the exhaust fan will start
- When the % output is equal to/less than the *"EXHAUST OUTPUT FOR FAN STOP,"* the exhaust fan will stop

Modulating Exhaust with VFD

- *"POWER EXHAUST TYPE"* MUST be set to MODULATE DAMPER–VFD
- *"BLDG PRESS"* setpoint MUST be programmed into Unit Controller
- *"EXHAUST OUTPUT FOR FAN START"* MUST be programmed into Unit Controller
- *"EXHAUST OUTPUT FOR FAN STOP"* MUST be programmed into Unit Controller

Sequence of Operation

- This option operates similar to the Modulating Damper w/ Fixed Speed Exhaust. The 0–10 VDC signal is sent to exhaust fan VFD instead of to exhaust damper actuator
- Building pressure rises above *"BLDG PRESS"* setpoint
- Unit Controller sends 0–10 VDC signal to exhaust fan VFD. Unit Controller will display this signal as a %. 0 VDC = 0% and 10 VDC = 100% (% output is displayed as EXHAUST DAMPER POSITION)
- When the % output is equal to/greater than *"EXHAUST OUTPUT FOR FAN START,"* exhaust fan will start
- When % output is equal to/less than *"EXHAUST OUTPUT FOR FAN STOP,"* exhaust fan will stop
- Exhaust fan VFD speed will be controlled by 0–10 VDC signal that is being sent by Unit Controller

VFD Exhaust Fan Control BAS

Overview

A communicated value has been provided to allow for control of the exhaust fan via a communicated signal from the Building Automation System (BAS). This will allow direct exhaust fan control to be provided by the BAS. This additional control will allow for building pressure control to be maintained by an external source and not controlled directly by the unit. The option of standard building pressure control is still available, as seen in the previous section *Modulating Exhaust with VFD on page 100.*

Required Programmed Values

- *"EXHAUST CONTROL BAS"* must be set to USER ENABLED via the SERVICE key or enabled through BAS Point EXH_CTRL_BAS(BV24)
- BAS Point to control Exhaust Fan Speed is EXH_DAMPER/VFD(AV52)
- *"POWER EXHAUST TYPE"* must be set to MODULATE DAMPER–VFD through the OPTIONS key / EXHAUST subsection
- *"EXHAUST OUTPUT FOR FAN START"* must be set using the SETPOINTS key / EXHAUST subsection
- *"EXHAUST OUTPUT FOR FAN STOP"* must be set using the SETPOINTS key / EXHAUST subsection

Operation

When the *"EXHAUST CONTROL BAS"* is set to USER ENABLED and the *"POWER EXHAUST TYPE"* is set to MODULATE DAMPER-VFD, the controller shall read a BACnet BAS Analog Value. This Analog Value shall be set up for 0–100%.

The controller shall read the BACnet Analog Value and drive the *"EXHAUST/RETURN FAN VFD"* to this value. For example, if the Analog Value is 27%, the *"EXHAUST/RETURN FAN VFD"* shall be 27%. The outputs shall follow this Analog Value.

When the Analog Value is more than or equal to the *"EXHAUST OUTPUT FOR FAN START,"* the Unit Controller will send a binary signal to the exhaust fan VFD, and the motor will start. This binary output originates at terminal 4 of terminal block TB1 of the Unit Controller.

When the Analog Value is less than or equal to the *"EXHAUST OUTPUT FOR FAN STOP,"* the Unit Controller will remove the binary signal to the exhaust fan VFD and the motor will stop.

RETURN FAN

The rooftop unit can be ordered with a return fan. A return fan is typically used on an HVAC system that has higher than normal return duct static. The return fan will assist the supply fan in making sure that proper return air flow is maintained. Return fans will be controlled by a VFD and will operate whenever the supply fan in operating.

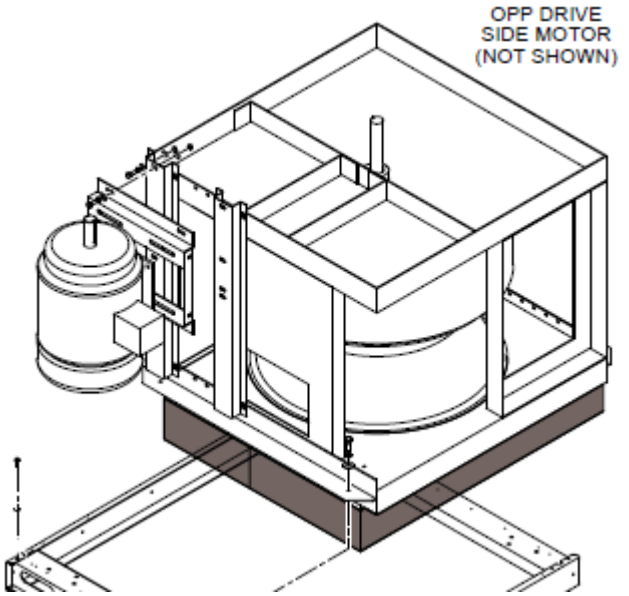


FIGURE 50 - RETURN FAN

Return Fan Options

- Return Fan without Exhaust
  - This selection will have no building pressure control
- Return Fan with Exhaust
  - This selection will have modulating exhaust dampers and building pressure control

Return Fan without Exhaust

"POWER EXHAUST TYPE" MUST be set to RETURN FAN W/O EXHAUST

Sequence of Operation

- Supply fan starts, air proving switch closes
- Return fan starts, dry contacts in return fan VFD close to prove operation
- The return fan plenum pressure transducer measures the pressure of the return fan plenum
- Based on the return fan plenum pressure, the Unit Controller will send a 0–10 VDC signal to the return fan VFD
- The return fan VFD will control the speed of the return fan to maintain the *"ACTIVE RETURN PLENUM PRESS"* setpoint (this setpoint is fixed at 0.05 iwg for a return fan without exhaust)

Return Fan with Exhaust

- *"POWER EXHAUST TYPE"* MUST be set to RETURN FAN W/ EXHAUST
- *"BLDG PRESS"* setpoint MUST be programmed into Unit Controller
- *"RETURN PRESSURE HIGH"* setpoint MUST be programmed into Unit Controller

Sequence of Operation

- Supply fan starts, air proving switch closes
- Return fan starts, dry contacts in return fan VFD close to prove operation
- Building pressure below *"BLDG PRESS"* setpoint (return fan will control like a Return Fan without Exhaust)
  - The return fan plenum pressure transducer measures the pressure of the return fan plenum
  - Based on the return fan plenum pressure, the Unit Controller will send a 0–10 VDC signal to the return fan VFD
  - The return fan VFD will control the speed of the return fan to maintain the *"ACTIVE RETURN PLENUM PRESS"* setpoint (this setpoint is fixed at 0.05 iwg)
- Building pressure equal to/greater than *"BLDG PRESS"* setpoint
- Once building pressure equals or rises above *"BLDG PRESS"* setpoint, Unit Controller sends 0–10 VDC signal to exhaust damper actuator. Unit Controller displays this signal as a %, and can be seen as EXHAUST DAMPER POSITION. (0 VDC = 0% and 10 VDC = 100%)
- As exhaust damper position increases, speed of return fan will be controlled by Return Fan Plenum Pressure Control Loop. *"ACTIVE RETURN PLENUM PRESS"* setpoint will be reset between *"MINIMUM RETURN PLENUM PRESS"* setpoint (non-adjustable 0.05 iwg) and *"RETURN PRESSURE HIGH"* setpoint (user adjustable between 0.15 iwg and 0.45 iwg)
- Once building pressure drops below *"BLDG PRESS"* setpoint, return fan will again be controlled like a Return Fan without Exhaust
- See *Figure 47 on page 102*

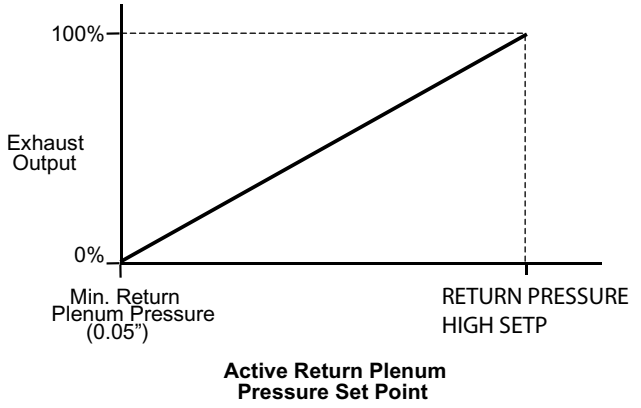


FIGURE 51 - ACTIVE RETURN PLENUM PRESSURE SETPOINT VS EXHAUST OUTPUT

VFD Return Fan with Exhaust BAS Control

Overview

A communicated value has been added to allow for the control of the modulating exhaust damper when using a return fan with exhaust on the rooftop unit. This will allow direct modulated exhaust damper control to be provided by the BAS. This additional control will allow for building pressure control to be maintained by an external source and not controlled directly by the unit.

Required Program Values

- *"EXHAUST CONTROL BAS"* must be set to USER ENABLED via the SERVICE key or enabled through BAS Point EXH_CTRL_BAS(BV24)
- BAS Point to control Exhaust Damper Position is EXH_DAMPER/VFD(AV52)
- *"POWER EXHAUST TYPE"* must be set to RETURN FAN W/EXHAUST through the OPTIONS key / EXHAUST subsection
- *"BLDG PRESS"* setpoint must be set using the SETPOINTS key / EXHAUST
- *"RETURN PRESSURE HIGH"* setpoint must be set using the SETPOINTS key / SUPPLY SYSTEM subsection

Operation

When the *"EXHAUST CONTROL BAS"* is set to USER ENABLED and the *"POWER EXHAUST TYPE"* is set to RETURN FAN W/EXHAUST, the controller shall read a BACnet BAS Analog Value. This Analog Value shall be set up for 0–100%.

The controller shall read the BACnet Analog Value and drive the *"EXHAUST DAMPER"* to this value. For example, if the Analog Value is 27%, the *"EXHAUST DAMPER"* shall be 27%. The outputs shall follow this Analog Value. The Return Fan operations remain unchanged. The speed of the Return Fan is still controlled by the Return Fan Plenum Pressure versus the *"RETURN FAN PLENUM PRESSURE"* setpoint. For specific Return Fan operation, see *Return Fan on page 101* and its subsections.

SMOKE PURGE

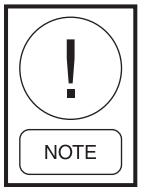
The unit has the ability to enter into one of three smoke purge sequences. These sequences should only be used in very specific applications. While in Smoke Purge Mode, all other functions and commands will be ignored.

Smoke Purge Sequences

1. Smoke Purge Sequence 1
2. Smoke Purge Sequence 2
3. Smoke Purge Sequence 3

Each of the above sequences can be set for one of three different control sequences:

1. Purge (Highest Priority)
2. Pressurization (Medium Priority)
3. Evacuation (Lowest Priority)



On VAV units, the supply fan VFD will still control to the* "ACTIVE DUCT STATIC"** ***setpoint.

Purge Mode

Sequence of Operation: Used to purge the space with fresh air.

- Start the supply fan
- Start the return fan (if applicable)
- Start the exhaust fan (if applicable)
- Open O/A dampers to 100% (if applicable)
- Close R/A dampers to 0% (if applicable)
- Open exhaust dampers to 100% (if applicable)

Pressurization Mode

Sequence of Operation: Used to pressurize the space in order to force the air inside the space through the walls to adjacent spaces or outside the building envelope.

- Start the supply fan
- Start the return fan (if applicable)
- Stop the exhaust fan (if applicable)
- Open O/A dampers to 100% (if applicable)
- Close the R/A dampers to 0% (if applicable)

Evacuation Mode

Sequence of Operation: Used to evacuate the space in order to draw air through the walls from adjacent spaces or outside the building envelope.

- Stop the supply fan
- Start the return fan (if applicable)
- Start the exhaust fan (if applicable)
- Close O/A dampers to 0% (if applicable)
- Open R/A dampers to 100% (if applicable)
- Open the exhaust dampers to 100% (if applicable)

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SECTION 6–USER INTERFACE CONTROL CENTER

USER INTERFACE CONTROL CENTER

The User Interface is used to commission, monitor, and troubleshoot the rooftop unit. It provides access to operational data, parameter programming, and access to past "history" information that was recorded at the time of a unit or system fault.

The User Interface is installed in the low voltage control compartment of the rooftop unit.

The User Interface uses a flexible membrane style keypad and has an 80 character (2 lines of 40 characters) liquid crystal display. The display has a lighted background for night viewing and can be viewed in direct sunlight. The backlighting will energize when any button is pressed.

The keypad allows complete control of the system from a central location. The keypad offers a multitude of commands available to access displays, program parameters, and initiate system commands. The keypad consists of thirty-six keys, that are divided into three categories, Data Entry, Navigation, and Menu Selection keys. A description of each of the keys is contained below.

Data Entry Keys

The Data Entry Keys provide a means to enter values for items that support edits. The keys available to support numeric input are the 0 through 9 keys, the decimal key, the +/- key, the **X** key and the ✓ key. The keys available to support choice input are the ◄ key, the ► key, the **X** key, and the ✓ key. Editing is started by pressing the ✓ key. ***Once editing has started, the user must press either the ✓ key or the X key***. Any other key press will result in the "**Press ✓ or X to Exit**" message displayed for two seconds. If you try to edit an item that is view only it will be ignored by the menu system.

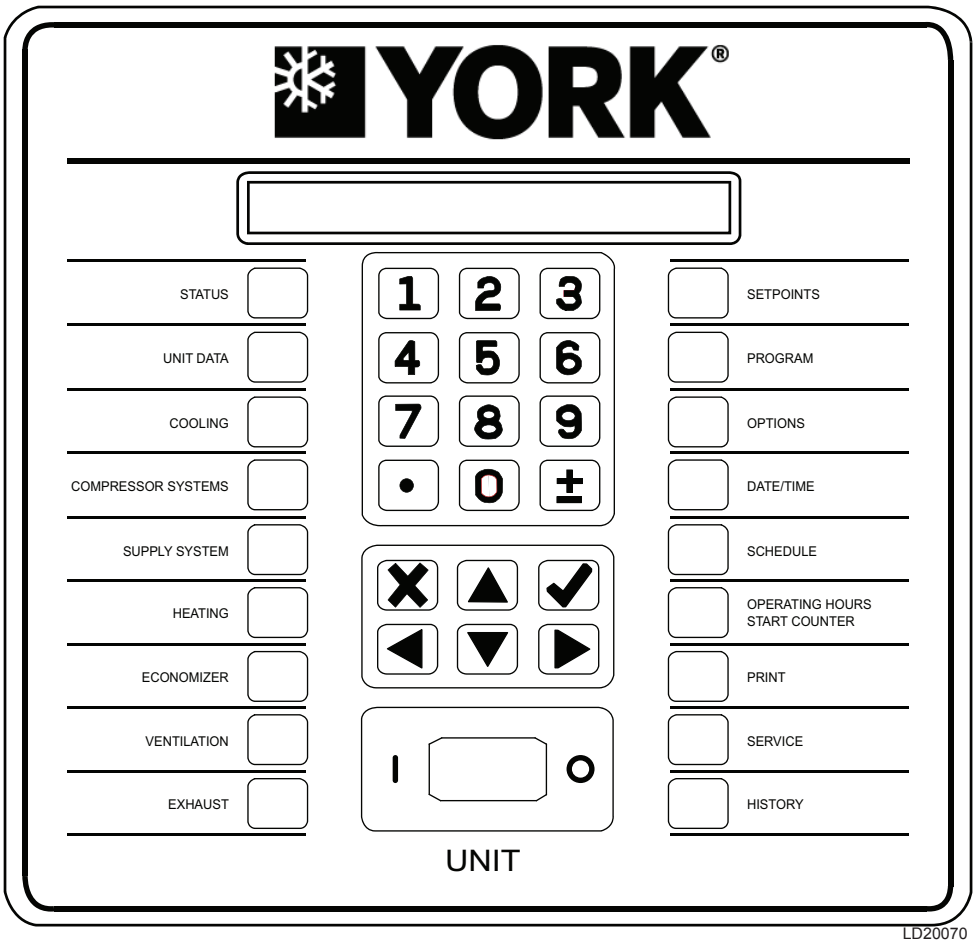

FIGURE 52 - USER INTERFACE CONTROL PANEL

When a numeric value that can be modified is displayed, the Default, High, and Low prompt will be shown in the upper right portion of the display. The cursor will be shown at the digit to be changed. The cursor will be shown after editing has started. After the desired numeric value has been entered, press the ✓ key to save the new value and exit the edit mode. Pressing the ◄ key will fill in the default value. Edits will only be accepted when followed by pressing the ✓ key. Pressing the **X** key while in the edit mode will cancel the edit mode and leave the value unchanged. If an out of range value is entered, the Default, High and Low prompt is replaced by the "Out of Range" message for two seconds.

When a choice value that can be modified is displayed, the ◄ ► prompt will be shown in the upper right portion of the display. The cursor will be shown after editing has been started. The ◄ key or the ► key will allow the different choices to be viewed. When the desired choice is displayed, press the ✓ key to save the new value and exit the edit mode. Pressing the **X** key while in the edit mode will cancel the edit mode and leave the value unchanged.

Navigation Keys

The Navigation keys provide a means to browse items within a menu. The keys currently available to support navigation are the Menu Select keys, the ▲ key, the ▼ key, the ◄ key, and the ► key.

Pressing a Menu Select key brings the user to the first screen under that menu. The screens within each menu are arranged in a circular list. The user may browse through the screens using the ▲ key and the ▼ key. Pressing the ▼ key will advance through the screens in order from top to bottom until the bottom screen has been reached. When the bottom screen is displayed, pressing the ▼ key will wrap the display to the top screen of the menu. Pressing the ▲ key will move through the screens in order from bottom to top until the top screen has been reached. When top screen is displayed, pressing the ▲ key will wrap the display to the bottom screen of the menu. Once either the ▲ key or the key ▼ is pressed, pressing any Menu Select key will bring the user to the first screen under that menu (even if it is the same menu being viewed).

Navigation through the circular list of items can also be achieved by repeated presses of the same Menu Select key, as long as no other keys are pressed. For example, pressing the UNIT DATA key three times will bring the user to the third screen of the UNIT DATA menu; pressing the UNIT DATA key once, then pressing the ▼ key, then pressing the UNIT DATA key again will bring the user to the first screen of the UNIT DATA menu.

The ◄ key and the ► key are used to scroll "sideways" between the same displays for each system. For example, when viewing the Sys 1 Pressures under the COMPRESSOR SYSTEMS key, pressing the ► key will scroll "sideways" to the Sys 2 Pressures display and pressing the ◄ key will scroll "sideways" to the Sys Pressures display for the last system on the unit.

When programming numeric or non-numeric values, the ▼ key and the ▲ key are used to scroll forward (down) and backward (up) through the items to be programmed or set.

Menu Select Keys

The following menu keys are available on the User Interface: STATUS, UNIT DATA, COOLING, COMPRESSOR SYSTEMS (1, 2, or 3), SUPPLY SYSTEM, HEATING, ECONOMIZER, VENTILATION, EXHAUST, SETPOINTS, PROGRAM, OPTIONS, DATE/TIME, SCHEDULE, OPERATING HOURS / START COUNTER, PRINT, SERVICE, and HISTORY.

Each of the above menu keys gives access to a list of specific items contained in that menu. To minimize clutter, only the items applicable to the current unit configuration will be displayed. Pressing any of the menu select keys at any time will send the user to the first item of the associated menu, provided the user is not editing an item in the current menu key item or the menu key is being used to navigate through a list of items.

Table 30 on page 107 through *Table 38 on page 118* list the information that is contained under the STATUS, UNIT DATA, COOLING, COMPRESSOR SYSTEMS (1, 2, or 3), SUPPLY SYSTEM, HEATING, ECONOMIZER, VENTILATION, and EXHAUST menu selection keys of the User Interface. The tables contain the Displayed Text, Pass Word Level (if applicable), Range of Values (if applicable), Default Value (if applicable), what key (SETPOINTS, PROGRAM, OPTIONS) to use to change the value (if applicable), and under what circumstances the item is displayed.

TABLE 36 - STATUS

DISPLAY TEXT	RANGE	DEFAULT	SETTING LOCATION	SHOWN WHEN
UNIT - OVERALL STATUS	Local Stop / Run / Unit Trip / Unit Fault / Unit Lockout / SMK Purge #-Press / SMK Purge #-Purge / SMK Purge #-Evac	Derived		Always
CURRENT OPER MODE	OCC Standby / OCC Cooling Low / OCC Cooling High / OCC Heating Low / OCC Heating High / UNOCC Standby / UNOCC Cooling Low / UNOCC Cooling High / UNOCC Heating Low / UNOCC Heating High / Morning Warm-Up / Comfort Vent Cooling / Comfort Vent Heating	Derived		Unit Type Equals SZVAV
CURRENT OPER MODE	OCC Standby / OCC Heating / OCC Cooling / UNOCC Standby / UNOCC Heating / UNOCC Cooling / Morning Warm-Up	Derived		Unit Type Equals VAV
SUPPLY SYS STATUS	Normal - Active / Normal Inactive / Safety Trip / Safety Fault / Safety Lockout	Derived		Always
COMP SYS 1 STATUS	Normal - Comp A On / Normal - Comp B On / Normal - Both On / Normal - Both Off / Safety Trip / Safety Fault / Safety Lockout / Low Amb Inhibit / Low Suct Temp Unl / High Dp Unload / User Disabled	Derived		Always
COMP SYS 2 STATUS	Normal - Comp A On / Normal - Comp B On / Normal - Both On / Normal - Both Off / Safety Trip / Safety Fault / Safety Lockout / Low Amb Inhibit / Low Suct Temp Unl / High Dp Unload / User Disabled	Derived		Always
COMP SYS 3 STATUS	Normal - Comp A On / Normal - Comp B On / Normal - Both On / Normal - Both Off / Safety Trip / Safety Fault / Safety Lockout / Low Amb Inhibit / Low Suct Temp Unl / High Dp Unload / User Disabled	Derived		Unit Size Equals 120 Ton Or 130 Ton
HEATING SYS STATUS	Normal - Active / Normal - Inactive / Safety Trip / Safety Fault / Safety Lockout / User Disabled / None	Derived		Always
ECONO SYS STATUS	Normal - Active / Normal - Inactive / Safety Trip / Safety Fault / Safety Lockout / User Disabled / None	Derived		Always
VENT SYS STATUS	Normal - Active / Normal - Inactive / Safety Trip / Safety Fault / Safety Lockout / User Disabled / None	Derived		Always
EXHAUST SYS STATUS	Normal - Active / Normal - Inactive / Safety Trip / Safety Fault / Safety Lockout / User Disabled / None	Derived		Always
SENSOR / MISC STATUS	Normal / Warning / Safety Trip / Safety Fault / Safety Lockout	Derived		Always
FILTER STATUS	Okay / Change	Derived		Always

TABLE 37 - UNIT DATA

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
UNIT TYPE	2	Variable Air Volume / Single Zone VAV	SZVAV	OPTIONS / UNIT DATA	Always
UNIT SIZE	2	120 Ton, 130 Ton, 150 Ton	50 TON	OPTIONS / UNIT DATA	Always
MODEL GENERATION		Mod G or Mod F	Mod G	OPTIONS / UNIT DATA	Always
REFRIGERANT TYPE	2	R-410A	R-410A	OPTIONS / UNIT DATA	Always

TABLE 31 - UNIT DATA (CONT'D)

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
FAST COMP START	2	User Enabled / User Disabled	User Disabled	OPTIONS/ UNIT DATA	Unit Size Is 70–150 Tons
UNIT DESIGN AIRFLOW	2	7500–52000 CFM	7500 CFM	OPTIONS/ UNIT DATA	Fast Comp Start Is User Enabled
CONTROL METHOD	1	Wired Zone Temp / Comm Zone Temp	Staged	OPTIONS / UNIT DATA	Unit Type Equals SZVAV
SAT RESET METHOD	1	Hardwired, Outside Air, Return Air, Supply Fan Speed	Hardwired Input	OPTIONS / UNIT DATA	Unit Type Equals VAV
SUPPLY AIR TEMP					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
ACTIVE SP		50.0–150.0°F	Derived		
ZONE TEMP*					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
OCC ZONE COOLING SETPOINT	1	OCC Zone Heating Setpoint + 2.0°F	72.0°F	SETPOINTS/ UNIT DATA	
ZONE TEMP*					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
UNOCC ZONE COOLING SETPOINT	1	Unocc Zone Heating Setpoint + 2.0°F to 95.0°F	85.0°F	SETPOINTS/ UNIT DATA	
ZONE TEMP*					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
OCC ZONE HEATING SETPOINT	1	60.0°F to OCC Zone Cooling Setpoint - 2.0°F	68.0°F	SETPOINTS/ UNIT DATA	
ZONE TEMP*					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
UNOCC ZONE HEATING SETPOINT	1	50.0°F to UNOCC Zone Cooling Setpoint - 2.0°F	60.0°F	SETPOINTS/ UNIT DATA	
SMOKE PURGE SEQ 1	1	Purge / Pressurization / Evacuation	Purge	SETPOINTS/ UNIT DATA	Always
SMOKE PURGE SEQ 2	1	Purge / Pressurization / Evacuation	Pressurization	OPTIONS / UNIT DATA	Always
SMOKE PURGE SEQ 3	1	Purge / Pressurization / Evacuation	Evacuation	OPTIONS / UNIT DATA	Always
DISPLAY LANGUAGE	1	English / Spanish	English	OPTIONS / UNIT DATA	Always
DISPLAY UNITS	1	Imperial / Metric	Imperial		Always

***NOTE:** ONLY THE ZONE TEMP SCREEN FOR THE CURRENT ACTIVE MODE WILL BE SHOWN.

TABLE 38 - COOLING

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
SUPPLY AIR TEMP					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
ACTIVE SP		50.0–150.0°F	Derived		
ZONE TEMP*					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
OCC ZONE COOLING SETPOINT	1	Occ Zone Heating + 2.0°F to 85.0°F	72.0°F	SETPOINTS/ COOLING	
ZONE TEMP*					
CURRENT		-20.0°F to 180.0°F	Look Up Table		Unit Type Equals SZVAV or VAV
UNOCC ZONE COOLING SETPOINT	1	Unocc Zone Heating + 2.0°F to 95.0°F	85.0°F	SETPOINTS/ COOLING	
RETURN AIR TEMP					
CURRENT		-20.0–180.0°F	Look Up Table		Unit Type Equals VAV
RAT COOLING SETPOINT	1	RAT Heating Setp + 2.0°F to RAT for High SAT	70.0°F	SETPOINTS/ COOLING	
EVAP AIR TEMP CURRENT					
CURRENT					
ACTIVE SP					
SUPPLY AIR HUMIDITY		Derived			
SAT LOW SETPOINT	1	50.0–60.0°F	55.0°F	SETPOINTS/ COOLING	Unit Type Equals VAV
SAT HIGH SETPOINT	1	55.0–65.0°F	65.0°F	SETPOINTS/ COOLING	VAV
OAT SETPOINT FOR					
LOW SAT	1	OAT Setpoint for High SAT to 90.0°F	80.0°F	SETPOINTS/ COOLING	Unit Type Equals VAV and SAT Reset Method Equals Outside Temp
HIGH SAT	1	60.0°F to OAT Setpoint for Low SAT	70.0°F	SETPOINTS/ COOLING	Unit Type Equals VAV and SAT Reset Method Equals Outside Temp
RAT SETPOINT FOR					
LOW SAT	1	RAT Setpoint for High RAT +5.0°F to 90.0°F	90.0°F	SETPOINTS/ COOLING	Unit Type Equals VAV and SAT Reset Method Equals Return Temp
HIGH SAT	1	RAT Cooling Setpoint to RAT Setpoint for Low SAT -5.0°F	80.0° F	SETPOINTS/ COOLING	Unit Type Equals VAV and SAT Reset Method Equals Return Temp

TABLE 32 - COOLING (CONT'D)

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
FAN SPEED SETPOINT FOR					
LOW SAT	1	Fan Speed Setpoint for High SAT to 100%	90%	SETPOINTS/ COOLING	Unit Type Equals VAV and SAT Reset Method Equals Supply Fan Speed
HIGH SAT	1	50% to Fan Speed Setpoint for Low SAT	70%	SETPOINTS/ COOLING	Unit Type Equals VAV and SAT Reset Method Equals Supply Fan Speed
SUP AIR TEMPERING	2	User Enabled User Disabled	User Disabled	PROGRAM/ COOLING	Unit Type Equals VAV
MECH CLG LOCKOUT TEMP	1	0.0–65.0°F	50.0°F	SETPOINTS/ COOLING	Press Trans Pkg and Low Ambient Pkg Other Than None
MECH CLG LOCKOUT TMP MINIMUM	2	-10.0–0.0°F	0.0°F	SETPOINTS/ COOLING	Press Trans Pkg and Low Ambient Pkg Other Than None

***NOTE:** ONLY THE ZONE TEMP SCREEN FOR THE CURRENT ACTIVE MODE WILL BE SHOWN.

TABLE 39 - COMPRESSOR SYSTEMS (1, 2, OR 3)

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
COMP SYS* STATUS		Normal - Comp A ON / Normal - Comp B ON / Normal - Both ON / Normal - Both OFF / Safety Trip / Safety Fault / Safety Lockout / Low Amb Inhibit / Low Suct Temp Unl / High Dp Unload / User Disabled	Derived		Always
COMP SYS* STATE	1	Stop / Run / Lockout / Auto Reset	Derived	OPTIONS / COMP SYS	Always
CONDENSER FAN 1A / 1		Off / On	Derived		Unit Size Equals 120–150 Ton
CONDENSER FAN 1B / 2		Off / On	Derived		Unit Size Equals 120–150 Ton
CONDENSER FAN 1C / 3					Unit Size Equals 120–150 Ton
CONDENSER FAN 2A / 4		Off / On	Derived		Unit Size Equals 120–150 Ton
CONDENSER FAN 2B / 5		Off / On	Derived		Unit Size Equals 120–150 Ton
CONDENSER FAN 2C / 6					Unit Size Equals 120–150 Ton
CONDENSER FAN 3A / 7		Off / On	Derived		Unit Size Equals 120–150 Ton

TABLE 33 - COMPRESSOR SYSTEMS (1, 2, OR 3) (CONT'D)

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
CONDENSER FAN 3B / 8		Off / On	Derived		Unit Size Equals 120–150 Ton
CONDENSER FAN 3C / 9					Unit Size Equals 120–150 Ton
SAFETY INPUT					
LPCO		Okay - Faulted	Derived		Always
CHAIN		Okay - Faulted	Derived		
SUCTION TEMP		-20.0–180.0°F	Look Up Table		Press Trans Pkg Indicates That Transducers Are Not Installed For the Applicable System
PRESSURE					
DISCHARGE*		0–800 PSIG (R-410A)	Look Up Table		Press Trans Pkg Indicates That Transducers Are Installed For the Applicable System
SUCTION *		0–320 PSIG (R-410A)	Look Up Table		
TEMPERATURE					
SUCTION	1	-20.0–180.0°F	Look Up Table		Press Trans Pkg Indicates That Transducers Are Installed For the Applicable System
SUPERHEAT		0.0–50.0°F	Derived		
CURRENT RUN TIME					
COMP A		HH:MM:SS	Derived		Always
COMP B		HH:MM:SS	Derived		
PUMPDOWN	2	User Enabled User Disabled	Disabled	PROGRAM/ COMP SYS.	Always
READY TO RUN					
COMP A		Yes - No	Derived		Always
COMP B		Yes - No	Derived		
READY TO STOP					
COMP A		Yes - No	Derived		Always
COMP B		Yes - No	Derived		
SYSTEM UNLOADING PRESSURE	2	450–650 PSIG (R-410A)	600 PSIG	SETPOINTS/ COMP SYS	Press Trans Pkg Does Not Equal None
PRESS TRANS PKG	2	None / Sys 1 / Sys 1, 2 / Sys 1, 2, 3	None	OPTIONAL/ COMP SYS	Always
LOW AMBIENT PKG	2	None / Sys 1 / Sys 1, 2 / Sys 1, 2, 3	None	OPTIONAL/ COMP SYS	Always

***NOTE:** MAY BE 1, 2, OR 3

TABLE 40 - SUPPLY SYSTEM

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
SUPPLY SYS STATUS		Normal - Active / Normal - Inactive / Safety Trip / Safety Fault Safety Lockout			Always
SUPPLY FAN					
OUTPUT		On - Off	Derived		Always
STATUS		Running Stopped	Derived		
SUPPLY FAN VFD SPEED		0–100%	Derived		Unit Type Equals VAV
SINGLE ZONE VAV MIN VFD SPEED		33–66%	50%		Unit Type Equals SZVAV
DUCT STATIC PRESS					
CURRENT		0.0–5.0 iwg	Look Up Table		Unit Type Equals VAV
ACTIVE SP		0.0–5.0 iwg	Derived		
RETURN FAN					
OUTPUT		On - Off	Derived		Power Exhaust Type Equals Return w/ Exhaust + Return w/o Exhaust Fans
STATUS		Running Stopped	Derived		
EXHAUST / RETURN FAN VFD		0–100%	Derived		Power Exhaust Type Equals Return w/ Exhaust + Return w/o Exhaust Fans
RETURN FAN PRESS					
CURRENT		-1.0 to 1.0 iwg	Look Up Table		Power Exhaust Type Equals Return w/ Exhaust + Return w/o Exhaust Fans
ACTIVE SP		0.0 to 1.0 iwg	Derived		
DUCT PRESS TRANSDUCER SPAN	2	1.25, 2.5, 5.0	5.0	SETPOINTS / SUPPLY SYSTEM	Unit Type Equals VAV
DUCT STATIC RESET LOW SETP	1	0–I iwg - Span 0 IWG to Duct Static Reset High	1.5 iwg	SETPOINTS / SUPPLY SYSTEM	Unit Type Equals VAV
DUCT STATIC RESET HIGH SETP	1	Duct Static Reset Low Limit to Span	2.5 iwg	SETPOINTS / SUPPLY SYSTEM	Unit Type Equals VAV
DUCT STATIC OVER PRESSURE	2	0–I iwg to 5 iwg	3.0 iwg	SETPOINTS / SUPPLY SYSTEM	Unit Type Equals VAV
RETURN PRESSURE HIGH SETP	2	0.15–0.45	0.15	SETPOINTS / SUPPLY SYSTEM	Power Exhaust Equals Return w/ Exhaust

TABLE 41 - HEATING

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
HEATING SYS STATUS		Normal - Active / Normal - Inactive / Faulted / User Disabled / Under Floor Control / None	Derived		Always
HEATING SYSTEM TYPE	2	None / Electric/ Staged Gas/ Modulating Gas/ Hot Water/ Steam	None	OPTIONS / HEATING	Always
GAS HEAT CAPACITY	2	1125 MBH	375 MBH	OPTIONS / HEATING	Heat Type Equals Staged Gas or Modulating Gas
ELEC HEAT CAPACITY	2	80 Kw / 80 Kw - 200V/ 108 Kw / 150 Kw / 200 Kw / 250 Kw	80 Kw	OPTIONS / HEATING	Heat Type Equals Electric
SUPPLY AIR TEMP					
CURRENT		-20.0–180.0°F	Look Up Table		Heat Type Does Not Equal None
ACTIVE SP		50.0–120.0°F	Derived		
ZONE TEMP*					
CURRENT		-20.0–180.0°F	Look Up Table		Always
OCC ZONE HEATING SETPOINT	1	60.0°F to OCC Zone Cooling Setpoint -2.0°F	68.0°F	SETPOINTS / HEATING	
ZONE TEMP*					
CURRENT		-20.0–180.0°F	Look Up Table		Always
UNOCC ZONE HEATING SETPOINT	1	50.0°F to UNOCC Zone Cooling Setpoint -2.0°F	60.0°F	SETPOINTS / HEATING	
RETURN AIR TEMP					
CURRENT		-20.0–180.0°F	Look Up Table		Heat Type Does Not Equal None and Unit Equals VAV
RAT HEATING SETPOINT	1	55.0°F - RAT Cooling Setpoint - 2.0°F	68.0°F	SETPOINTS / HEATING	
HEAT ENTERING TEMP		-20.0–180.0°F	Look Up Table		Heat Type Equals Staged Gas
STAGED HEAT STATUS					
STGS ON		0 to 6	Derived		Heat Type Equals Electric or Staged Gas
STGS AVAL		2 to 6	Derived		
HW / STEAM					
VALVE POS		0–100%	Derived		Heat Type Equals Hot Water Heat Steam
FRZ STAT		OK Tripped	Derived		
HEATING CONTROL OFFSET		1.0–100.0°F	Derived		
MOD FURNACE OUTPUT					
RELATIVE		0–100%	Derived		Heat Type Equals Modulating Gas
APRX RATE		37.5–900.0 MBH	Derived		
FURNACE 1A MODE		Off / Purge / Ignition / On - Low / On - High / Safety Trip / Safety Fault / Safety Lockout / Fault - L/O	Derived		Heat Type Equals Modulating Gas

TABLE 35–HEATING (CONT'D)

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
FURNACE 1A MODE					
RELATIVE		0–100%	Derived		Heat Type Equals Modulating Gas
APRX RATE		37.5–150.0 MBH	Derived		
FURNACE 1B MODE		Off / Purge / Ignition / On / Safety Trip / Safety Fault / Safety Lockout / Fault -L/O	Derived		Heat Type Equals Modulating Gas
FURNACE 1 MODE		Off / Purge / Ignition / On - Low / On - High / Safety Trip / Safety Fault / Safety Lockout / Fault -L/O	Derived		Heat Type Equals Staged Gas
FURNACE 2 MODE		Off / Purge / Ignition / On - Low / On - High / Safety Trip / Safety Fault / Safety Lockout / Fault -L/O	Derived		Gas Heat Size Equals 750 MBH or 1125 MBH
FURNACE 3 MODE		Off / Purge / Ignition / On - Low / On -High / Safety Trip / Safety Fault / Safety Lockout / Fault -L/O	Derived		Gas Heat Size Equals 1125 MBH
HEATING SYSTEM	1	User Enabled User Disabled	User Enabled	PROGRAM / HEATING	Heat Type Does Not Equal None
MORNING WARM UP	1	User Enabled User Disabled	User Disabled	PROGRAM / HEATING	Heat Type Does Not Equal None
ADAPT MORN WARM UP	1	User Enabled User Disabled	User Disabled	PROGRAM / HEATING	Heat Type Does Not Equal None
NIGHT SET BACK	1	User Enabled User Disabled	User Disabled	PROGRAM / HEATING	Heat Type Does Not Equal None
HEAT LIMIT TEMPERATURE	2	100.0–150.0°F	130.0°F	SETPOINTS / HEATING	Heat Type Does Not Equal None
HEATING SAT	1	80.0–115.0°F	100.0°F	SETPOINTS / HEATING	Heat Type Does Not Equal None, Unit Type Equals VAV
HW VALVE ACTION	2	Direct - Reverse	Direct	PROGRAM / HEATING	Heating Type Equals Hot Water Steam
IST STAGE HEATING SETPOINT	1	80.0–95.0°F	85.0°F	SETPOINTS / HEATING	Heat Type Does Not Equal None and Unit Type Equals SZVAV
2ND STAGE HEATING SETPOINT	1	95.0–115.0°F	100.0°F	SETPOINTS / HEATING	Heat Type Does Not Equal None and Unit Type Equals SZVAV
DAILY WARM UP TIME DAY 1		0 Min. To Morning Warm Up Max Time	Derived		Heat Type Does Not Equal None and Morn Warm Up Equals Enabled

TABLE 35–HEATING (CONT'D)

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
DAILY WARM UP TIME DAY 2		0 Min. to Morning Warm Up Max Time	Derived		Heat Type Does Not Equal None and Morn Warm Up Equals Enabled
DAILY WARM UP TIME DAY 3		0 Min. to Morning Warm Up Max Time	Derived		Heat Type Does Not Equal None and Morn Warm Up Equals Enabled
DAILY WARM UP TIMER		0 Min. to Morning Warm Up Max Time	Derived		Heat Type Does Not Equal None and Morn Warm Up Equals Enabled
MORNING WARM UP OPT TIME		0 Min. to Morning Warm Up Max Time	Derived		Heat Type Does Not Equal None and Morn Warm Up Equals Enabled
MORNING WARM UP MAX TIME	1	15–240 Min.	120 Min.	SETPOINTS/ HEATING	Heat Type Does Not Equal None and Morn Warm Up Equals Enabled

***NOTE:** ONLY THE ZONE TEMP SCREEN FOR THE CURRENT ACTIVE MODE WILL BE SHOWN.

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TABLE 42 - ECONOMIZER

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
ECONO SYS STATUS		Normal - Active / Normal - Inactive / Faulted / User Disabled / None	Derived		Always
ECONO INSTALLED	2	None / Dry Bulb / Single Enthalpy / Dual Enthalpy	None	OPTIONS / ECONOMIZER	Always
ECONO METHOD TO USE	1	Dry Bulb / Single Enthalpy / Dual Enthalpy / Best Available	Best Available	OPTIONS / ECONOMIZER	Economizer Installed Does Not Equal None
ECONO METHOD ACTIVE		Dry Bulb / Single Enthalpy / Dual Enthalpy	Derived		Economizer Installed Does Not Equal None
ECONOMIZER CONTROL OUTPUT		0–100%	Derived		Economizer Installed Does Not Equal None
OUTSIDE AIR TEMP		-20.0–180.0°F	Look Up Table		Economizer Installed Does Not Equal None

TABLE 36–ECONOMIZER (CONT'D)

OUTSIDE AIR					
HUMIDITY		0–100%	Look Up Table		Economizer Installed Equals Single Enthalpy Or Dual Enthalpy
ENTHALPY		7.2–204.9 Btu/lb	Look Up Table		Economizer Installed Equals Single Enthalpy Or Dual Enthalpy
RETURN AIR TEMP		-20.0–180.0°F	Look Up Table		Economizer Installed Equals Dual Enthalpy
RETURN AIR					
HUMIDITY		0–100%	Look Up Table		Economizer Installed Equals Dual Enthalpy
ENTHALPHY		7.2–204.9 Btu/lb	Look Up Table		Economizer Installed Equals Dual Enthalpy
OUTSIDE AIR ENTHALPY SETPOINT	1	22.0–40.0 Btu/lb	28.0 Btu/lb	SETPOINTS / ECONOMIZER	Economizer Installed Does Not Equal None
ECONOMIZER SYSTEM	1	User Enabled User Disabled	Disabled	PROGRAM / ECONOMIZER	Economizer Installed Does Not Equal None

TABLE 43 - VENTILATION

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
VENT SYS STATUS		Normal - Active / Normal - Inactive / Faulted / User Disabled / None	Derived		Always
DAMPER HARDWARE	2	None / 2 Position / Standard / TEK Air Full IAQ	Standard Dampers	OPTIONS / VENTILATION	Always
VENTILATION CONTROL	1	Fixed Minimum / Demand	Fixed Minimum	OPTIONS / VENTILATION	Damper Hardware Does Not Equal None or 2 Position
OA DAMPER POSITION					
CURRENT		0–100%	Derived		Damper Hardware Does Not Equal None
ACTIVE SP		0–100%	Derived		
IAQ DMPR AIR FLOWS					
OA FLOW 1		0 to Derived Span	Derived		Damper Hardware Min. TEK-Air Full IAQ

TABLE 39–VENTILATION (CONT'D)

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
OUTSIDE AIR FLOW					
TOTAL		0 to Derived Span	Derived		Damper Hardware Min. TEK-Air Full IAQ
ACTIVE SP		0 to Derived Span	Derived		
VENTILATION DEMAND		0–100%	Derived		Ventilation Control Equals Demand
CO2 LEVEL					
OUTSIDE		0–2000 PPM	Look Up Table		Ventilation Control Equals Demand
INSIDE		0–2000 PPM	Look Up Table		
CO2 OFFSET					
CURRENT		± 0–2000 PPM	Derived		Ventilation Control Equals Demand
SETPOINT	1	100–1000 PPM	500 Ppm	SETPOINTS / VENTILATION	
OA DAMPER MINIMUM POSITION	1	0% to O/A Damper Maximum Position	15%	SETPOINTS / VENTILATION	Damper Hardware Does Not Equal None Or 2 Position Damper
OA DAMPER MAXIMUM POSITION	1	O/A Damper Minimum Position to 100%	30%	SETPOINTS / VENTILATION	Damper Hardware Does Not Equal None Or 2 Position Damper
CONTINUOUS VENT	1	User Enabled User Disabled	User Enabled	PROGRAM / VENTILATION	Unit Type Equals SZVAV
COMFORT VENTILATION	1	User Enabled User Disabled	User Disabled	PROGRAM / VENTILATION	Unit Type Equals SZVAV
OUTSIDE AIR MINIMUM FLOW	1	Minimum - Derived Span x 5% Maximum - the Lower of Derived Span x 50% and Outside Air Maximum Flow	Derived Span x 15%	SETPOINTS / VENTILATION	Damper Hardware and Ventilation Control Set to Demand TEK-Air Full IAQ
OUTSIDE AIR MAXIMUM FLOW	1	Minimum - Outside Air Minimum Flow Maximum - Derived Flow	Derived Span x 30%	SETPOINTS / VENTILATION	Damper Hardware and Ventilation Control Set to Demand
MINIMUM OA FLOW SETPOINT	1	0–100%	Derived Span x 15%	SETPOINTS / VENTILATION	Damper Hardware and Ventilation Control Set to Fixed Minimum TEK-Air Full IAQ
VENTILATION SYSTEM	1	User Enabled User Disabled	User Enabled	PROGRAM / VENTILATION	Damper Hardware Does Not Equal None

TABLE 44 - EXHAUST

DISPLAY TEXT	PASSWORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
EXHAUST SYS STATUS		Normal - Active / Normal - Inactive / Faulted / User Disabled / None	Derived		Always
POWER EXHAUST TYPE	2	None / On-Off Damper Ctrl / On-Off Press Cntrl / Modulate Damper - VFD / Return Fan w/ Exh / Return Fan w/o Exh	Setting	OPTIONS / EXHAUST	Always
BUILDING PRESSURE					
CURRENT		-0.5 to 0.5 iwg	Look Up Table		Power Exhaust Does Not Equal None Or On-Off Damper Ctrl
ACTIVE SETPOINT	1	-0.15 to 0.1 iwg	0.0 iwg	SETPOINTS / EXHAUST	
EXHAUST FAN					
OUTPUT		On - Off	Derived		Power Exhaust Equals On-Off Damper Ctrl, On-Off Press Cntrl, Modulate Damper - VFD Fan
STATUS		Stopped / Running	Derived		
EXHAUST DAMPER POSITION		0–100%	Derived		Power Exhaust Equals Modulate Damper - VFD, Or Return Fan w/ Exh
EXHAUST / RETURN FAN VFD		0–100%	Derived		Power Exhaust Equals Modulate Damper - VFD
BLDG PRESSURE CNTRL OFFSET	1	-0.15 to 0.15 iwg	0.0 iwg	SETPOINTS / EXHAUST	Power Exhaust Equals On-Off Press Ctrl
ECONO OUTPUT FOR FAN START	1	Econo Output for Fan Stop to 100%	10 %	SETPOINTS / EXHAUST	Power Exhaust Equals On-Off Dmpr Ctrl
ECONO OUTPUT FOR FAN STOP	1	0% to Econo Output for Fan Start	5%	SETPOINTS / EXHAUST	Power Exhaust Equals On-Off Dmpr Ctrl
EXHAUST OUTPUT FOR FAN START	1	Exhaust Output for Fan Stop to 100%	10%	SETPOINTS / EXHAUST	Power Exhaust Equals Modulate Damper - VFD
EXHAUST OUTPUT FOR FAN STOP	1	0% to Exhaust Output For Fan Start	5%	SETPOINTS / EXHAUST	Power Exhaust Equals Modulate Damper - VFD

Setpoints

All "Setpoints" values are numeric. Setpoints parameters can be viewed under their respective menu key on the left side of the keypad; however, they can only be changed under the SETPOINTS key using the following procedure. Press the SETPOINTS key to enter the setpoints menu. The Enter Password screen will appear. All setpoints parameters require the use of a password before they can be changed. See *Password on page 132* for information on how to enter a Password into the User Interface. If a Level 1 password is entered, only Level 1 setpoints will be available for change. Entering a Level 2 password will make all setpoints available. After the password has been accepted, use the ◄ key or the ► key to select the menu subsection: Unit, Cooling, Compressor Systems, Supply System, Heating, Economizer, Ventilation, or Exhaust that contains the parameter you would like to change. The setpoints contained under each of these menu subsections and their password level is contained in *Table 31 on page 107 through Table 38 on page 118*. Then use the ▼ key and the ▲ key to navigate to the parameter you want to change. Follow the instructions given in *Data Entry Keys on page 105* to change the value.

Program

All "Program" information is USER ENABLED/ USER DISABLED values. Program parameters can be viewed under their respective menu key on the left side of the keypad; however, they can only be changed under the PROGRAM key using the following procedure. Press the PROGRAM key to enter the "Program" menu. The Enter Password screen will appear. All Program parameters require the use of a password before they can be changed. See *Password on page 132* for information on how to enter a Password into the User Interface. If a Level 1 password is, entered only Level 1 "program" information will be available for change. Entering a Level 2 password will make all "program" information available. After the password has been accepted, use the ◄ key or the ► key to select the menu subsection: Unit, Cooling, Compressor Systems, Supply System, Heating, Economizer, Ventilation, Exhaust, that contains the parameter you would like to change. The parameters contained under each of these menu subsections and their password level are contained in *Table 31 on page 107 through Table 38 on page 118*. Then use the ▼ key and the ▲ key to navigate to the parameter you want to change. Follow the instructions given in *Data Entry Keys on page 105* to change the parameter to the desired value.

Options

All "Options" information is selected from the listed parameter data. Options parameters can be viewed under their respective menu key on the left side of the keypad; however, they can only be changed under the OPTIONS key using the following procedure. Press the OPTIONS key to enter the "Options" menu. The Enter Password screen will appear. All Option parameters require the use of a password before they can be changed. See *Password on page 132* for information on how to enter a Password into the User Interface. If a Level 1 password is entered, only Level 1 "options" information will be available for change. Entering a Level 2 password will make all "options" information available. After the password has been accepted, use the ◄ key or the ► key to select the menu subsection: Unit, Cooling, Compressor Systems, Supply System, Heating, Economizer, Ventilation, or Exhaust that contains the parameter you would like to change. The parameters contained under each of these menu subsections and their password level are contained in *Table 31 on page 107 through Table 38 on page 118*. Then use the ▼ key and the ▲ key to navigate to the parameter you want to change. Follow the instructions given in *Data Entry Keys on page 105* to change the parameter to the desired value.

Date / Time

To change the day, time, and date press the DATE/ TIME key. The ▼ key is used to scroll to the next item to be programmed and the ▲ key scrolls to the previous item. The following messages will be displayed. The first line will be an active display and the second line will be the entry line.

CLOCK FRI 18 JUN 2017 10:15:33 AM
DAY OF MONTH =XX

CLOCK FRI 18 JUN 2017 10:15:33 AM
DAY OF MONTH =XX

CLOCK FRI 18 JUN 2017 10:15:33 AM
YEAR =XXXX

CLOCK FRI 18 JUN 2017 10:15:33 AM
HOUR =XX

CLOCK FRI 18 JUN 2017 10:15:33 AM
MINUTE =XX

CLOCK FRI 18 JUN 2017 10:15:33 AM
DAY OF WEEK =XXX

CLOCK FRI 18 JUN 2017 10:15:33 AM
12 HOUR PERIOD =XX

CLOCK FRI 18 JUN 2017 10:15:33 AM
TIME FORMAT =XXXXXXX

CLOCK FRI 18 JUN 2017 10:15:33 AM
POWER OFF TIME =XXXXX

Follow the instructions given in *Data Entry Keys on page 105* to change the above values.

Schedule

The "clock schedule" function can be USER ENABLED / USER DISABLED by using the schedule screen below.

To set the schedule, press the SCHEDULE key. The display will show the following message:

SCHEDULE ✓ TO EDIT
OCCUPANCY SCHEDULE USER ENABLED

SCHEDULE MON ✓ TO EDIT
+START =06:00 AM STOP =10:00 PM

SCHEDULE TUE ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE WED ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE THU ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE FRI ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE SAT ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE SUN ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

To change the start or stop time, press the ✓ key. The line under the 0 is the cursor. If the start time is wrong, it may be changed from the numeric keypad. Once the correct value (hour and minute) is entered, press the ✓ key. The cursor will then move to the AM/PM selection. This value may be chosen by the +/- key and entered by pressing the ✓ key. This process may be followed until the hour, minutes, and meridian of both the START and STOP points are set. Press the ▼ key to get the schedule for the next day to appear. The start and stop time of each day may be programmed differently. If you want to view the schedule without making a change, simply press the ▼ key until the day you wish to view appears. The ▲ key will scroll backwards to the previous screen.

After the SUN (Sunday) schedule appears on the display a subsequent press of the ▼ key will display the Holiday schedule. This is a two-part display. The first reads:

SCHEDULE HOL
START =06:00 AM STOP =10:00 PM

The times may be set using the same procedure as described above for the days of the week.

Continue pressing the ▼ key to set the 15 holiday dates. The display will read:

SCHEDULE MMDD
HOLIDAY 01 = 1225

The month and the day of each holiday are entered in this format. Enter 0000 to not specify a holiday. The MMDD is displayed when the value is being edited to remind the operator what the format of this number is. Eg. 1225 represents December 25.

The line below the empty space is the cursor and will move to the next or previous empty space when the ◄ key or the ► key is pressed. To set the Holiday, the cursor is moved to the space following the day of the week of the holiday and the +/- key is pressed. An * will appear in the space signifying that day as a holiday. The Holiday schedule must be programmed weekly. If there is no holiday, the +/- key is used to delete the *. The ✓ key is used to accept the holiday schedule for the next seven days.

OPERATING HOURS / START COUNTER

Compressor Operating hours and Compressor Starts; Supply Fan Operating hours and Supply Fan starts; Exhaust Fan operating hours and Exhaust Fan starts; and Return Fan operating hours and Return Fan starts are displayed via one key press. The maximum value for both hours and starts is 99,999; at which point they will roll over to 0. The following are the displays.

TABLE 45 - OPERATING HOURS / START COUNTER

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN
COMPRESSOR 1A OPER HRS COMPRESSOR 1A STARTS	1		DERIVED		
COMPRESSOR 1B OPER HRS COMPRESSOR 1B STARTS	1		DERIVED		
COMPRESSOR 2A OPER HRS COMPRESSOR 2A STARTS	1		DERIVED		
COMPRESSOR 2B OPER HRS COMPRESSOR 2B STARTS	1		DERIVED		
COMPRESSOR 3A OPER HRS COMPRESSOR 3A STARTS	1		DERIVED		Number of Comps 6. Unit Capacity Equals 120 Ton or 130 Ton
COMPRESSOR 3B OPER HRS COMPRESSOR 3B STARTS	1		DERIVED		
CONDENSER FAN 1A					
CONDENSER FAN 1B					
CONDENSER FAN 2A					
CONDENSER FAN 2B					
CONDENSER FAN 3A					Number of Comps 6. Unit Capacity Equals 120 Ton or 130 Ton
CONDENSER FAN 3b					
EXHAUST FAN OPER HRS EXHAUST FAN STARTS	1		DERIVED		Power Exhaust On/Off Dmpr / On/ Off Press / Modulate Damper - VFD
SUPPLY FAN OPER HRS SUPPLY FAN STARTS	1		DERIVED		
RETURN FAN OPER HRS RETURN FAN STARTS	1		DERIVED		Supply System Type Equals Return Fan w/ Exh Return w/o Exhaust.

Shown below is a typical screen example.

HOURS / STARTS	oper HRS.	xxxxx
COMPRESSOR 1A	Starts	xxxxx

PRINTER

The Unit Controller has the capability of being connected though the RS-232 serial port, Port 2, to a computer using Hyper Terminal. A NUL MODEM cable must be used to connect the computer to the Unit Controller.

Setup

The computer must be connected to Port 2 of the Unit Controller. Use the SERVICE key to verify that Port 2 is configured to "TERMINAL."

Press the PRINT key on the keypad. Use the ▼ key to set the following:

- PRTINER BAUD RATE
- PRINTER PARITY
- PRINTER STOP BITS
- PRINTER ROWS PER PAGE

These parameters must be set identical to the settings in Hyper Terminal. In addition, the data bits must be set to 8, and Flow Control to NONE.

To use Hyper Terminal to save a report to a file:

1. Select "Transfer–Transfer Text" and enter a file name to save the report in.
2. From the Unit Controller, select the report you want to print. See *Report Section on page 122* to select the report.
3. As the report is uploading from the Unit Controller to the PC, it is displayed in the Hyper Terminal window.
4. When the reports finish transferring to the file, select "Transfer–Capture Text–Stop."
5. The file can then be printed from an application like Notepad or Word.

To use Hyper Terminal to print a report without saving it to a file:

1. Select "Transfer–Capture to Printer."
2. From the Unit Controller, select the report you want to print. See *Report Section on page 122* to select the report.
3. As the report is uploading from the Unit Controller to the PC, it is displayed in the Hyper Terminal window.
4. After the reports finish transferring to the PC, select "Transfer–Capture to Printer" to send the last page to the printer.

Report Section

Press the PRINT key and enter the password. Press the ✓ key. Use the ◄ or ► key to navigate through the menu. The following reports are available to be printed:

- STATUS
- UNIT DATA
- COOLING
- COMP SYSTEM
- SUPPLY SYSTEM
- HEATING
- ECONOMIZER
- VENTILATION
- EXHAUST
- SETPOINTS
- PROGRAM
- OPTIONS
- DATE / TIME
- SCHEDULE
- HOURS / STARTS
- SERVICE
- HISTORY BUFFER 1
- HISTORY BUFFER 2
- HISTORY BUFFER 3
- HISTORY BUFFER 4
- HISTORY BUFFER 5
- HISTORY BUFFER 6
- HISTORY BUFFER 7
- HISTORY BUFFER 8
- HISTORY BUFFER 9
- HISTORY BUFFER 10
- RUN TEST
- PRINT ALL REPORTS

After you have selected the report you want to print, press the ✓ key to output the report to the computer.

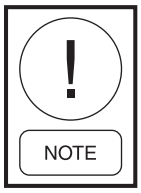
SERVICE

To enter Service mode, press the SERVICE key. The following message is the initial screen and is displayed when the SERVICE key is pressed, unless a Level 2 password is active.

SERVICE ENTER PASSWORD

All the DIGITAL outputs (DO) except for the compressors can be forced ON. In order to force the outputs the LOCAL STOP switch must be in the off position. To force an output ON use the ◄ or ► key to navigate to the SERVICE DO section. Then use the ▲ or ▼ key to select the output you want to force ON. Press the ✓ key and then use the ► key to switch it from OFF to ON. Press the ✓ key again to energize the output. Repeat the above process in reverse to turn the forced output back to OFF.

All the ANALOG outputs (AO) can be forced ON. In order to force the outputs the LOCAL STOP switch must be in the OFF position. To force an output ON use the ◄ or ► key to navigate to the SERVICE AO section. Then use the ▲ or ▼ key to select the output you want to force ON. Press the ✓ key and then use the numeric key pad to enter the output value. Press the ✓ key again to energize the output. Repeat the above process in reverse to turn the forced output back to 0.0.



Failure to do so will leave the forced output value in place until a different value is initiated by the operation of the unit.

The ► key can be used to jump to the beginning of the next section of displays and the ◄ key can be used to jump to the beginning of the previous section of displays. The sections of displays are as follows:

- Parameters
- Analog Inputs
- Digital Inputs
- Digital Outputs
- Analog Outputs

Table 40 on page 123 lists the Displayed Text, Input or Output type, Unit Control terminal location (ID), Value Range, Location, and Description.

TABLE 46 - SERVICE

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
DATA LOG FORMAT			Off		Used to Activate the Data Log Feature of the Control
DATA LOG ERROR	Error Detail		See *Table 55 on page 170*		Data Log Error Detail (Only Displayed When Error Is Present)
	Error State		See *Table 54 on page 169*		Data Log Error State (Only Displayed When Error Is Present)
UPDATE FLASH			On / Off		Used to Update Control Software
UPDATE FLASH ERROR					Description of the Error (Only Displayed When Error is Present)
FACTORY RUN TESTER			User Disable / User Enable		Only Used for Factory Run Test
COMPRESSOR 1A	Digital Output	TB4-2	On / Off	I/O Board	Status of the Digital Output to Compressor 1A
COMPRESSOR 1B	Digital Output	TB4-3	On / Off	I/O Board	Status of the Digital Output to Compressor 1
COMPRESSOR 2A	Digital Output	TB4-4	On / Off	I/O Board	Status of the Digital Output to Compressor 2A
COMPRESSOR 2B	Digital Output	TB4-5	On / Off	I/O Board	Status of the Digital Output to Compressor 2B

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
COMPRESSOR 3A	Digital Output	TB4-7	On / Off	I/O Board	Status of the Digital Output to Compressor 3A
COMPRESSOR 3B	Digital Output	TB4-8	On / Off	I/O Board	Status of the Digital Output to Compressor 3B
CONDENSER FAN 1A/1	Digital Output	TB4-9	On / Off	I/O Board	Status of the Digital Output to Condenser Fan 1A
CONDENSER FAN 1B/2	Digital Output	TB4-10	On / Off	I/O Board	Status of the Digital Output to Condenser Fan 1B
CONDENSER FAN 1C/3	Digital Output		On / Off	I/O Board	Status of the Digital Output to Condenser Fan 1C
CONDENSER FAN 2A/4	Digital Output	TB6-2	On / Off	I/O Board	Status of the Digital Output to Condenser Fan 2A
CONDENSER FAN 2B/5	Digital Output	TB6-3	On / Off	I/O Board	Statusof the Digital Output to Condenser Fan 2B
CONDENSER FAN 2C/6	Digital Output		On / Off	I/O Board	Status of the Digital Output to Condenser Fan 2C
CONDENSER FAN 3A/7	Digital Output	TB6-4	On / Off	I/O Board	Status of the Digital Output to Condenser Fan 3A
CONDENSER FAN 3B/8	Digital Output	TB6-5	On / Off	I/O Board	Status of the Digital Output to Condenser Fan 3B
CONDENSER FAN 3C/9	Digital Output		On / Off	I/O Board	Status of the Digital Output to Condenser Fan 3C
ELECTRIC HEAT STG 1	Digital Output	TB3-2	On / Off	I/O Board	Status of the Electric Heat Digital Output to Stage 1
ELECTRIC HEAT STG 2	Digital Output	TB3-3	On / Off	I/O Board	Status of the Electric Heat Digital Output to Stage 2
ELECTRIC HEAT STG 3	Digital Output	TB3-4	On / Off	I/O Board	Status of the Electric Heat Digital Output to Stage 3
ELECTRIC HEAT STG 4	Digital Output	TB3-5	On / Off	I/O Board	Status of the Electric Heat Digital Output to Stage 4
ELECTRIC HEAT STG 5	Digital Output	TB3-7	On / Off	I/O Board	Status of the Electric Heat Digital Output to Stage 5
ELECTRIC HEAT STG 6	Digital Output	TB3-8	On / Off	I/O Board	Status of the Electric Heat Digital Output to Stage 6
ELECTRIC HEAT STG 7	Digital Output	TB3-9	On / Off	I/O Board	Status of the Electric Heat Digital Output to Stage 7
STG GAS FURN 1 LOW	Digital Output	TB3-2	On / Off	I/O Board	Status of the Staged Gas Heat Digital Output to Stage 1 Low
STG GAS FURN 1 HIGH	Digital Output	TB3-3	On / Off	I/O Board	Status of the Staged Gas Heat Digital Output to Stage 1 High
STG GAS FURN 2 LOW	Digital Output	TB3-4	On / Off	I/O Board	Status of the Staged Gas Heat Digital Output to Stage 2 Low
STG GAS FURN 2 HIGH	Digital Output	TB3-5	On / Off	I/O Board	Status of the Staged Gas Heat Digital Output to Stage 2 High
STG GAS FURN 3 LOW	Digital Output	TB3-7	On / Off	I/O Board	Status of the Staged Gas Heat Digital Output to Stage 3 Low
STG GAS FURN 3 HIGH	Digital Output	TB3-8	On / Off	I/O Board	Status of the Staged Gas Heat Digital Output to Stage 3 High

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
MOD GAS FURN 1A LOW	Digital Output	TB3-2	On / Off	I/O Board	Status of the Mod Gas Heat Digital Output to Stage 1A Low
MOD GAS FURN 1A HI	Digital Output	TB3-3	On / Off	I/O Board	Status of the Mod Gas Heat Digital Output to Stage 1A High
MOD GAS FURN 2 LOW	Digital Output	TB3-4	On / Off	I/O Board	Status of the Mod Gas Heat Digital Output to Stage 2 Low
MOD GAS FURN 2 HIGH	Digital Output	TB3-5	On / Off	I/O Board	Status of the Mod Gas Heat Digital Output to Stage 2 High
MOD GAS FURN 3 LOW	Digital Output	TB3-7	On / Off	I/O Board	Status of the Mod Gas Heat Digital Output to Stage 3 Low
MOD GAS FURN 3 HIGH	Digital Output	TB3-8	On / Off	I/O Board	Status of the Mod Gas Heat Digital Output to Stage 3 High
MOD GAS FURN 1B	Digital Output	TB3-9	On / Off	I/O Board	Status of the Mod Gas Heat Digital Output to Stage 1B
PUMP DOWN LLSV 1	Digital Output	TB5-2	On / Off	I/O Board	Status of the Pump Down Solenoid Llsv 1 Digital Output
PUMP DOWN LLSV 2	Digital Output	TB5-4	On / Off	I/O Board	Status of the Pump Down Solenoid Llsv 2 Digital Output
PUMP DOWN LLSV 3	Digital Output	TB5-6	On / Off	I/O Board	Status of the Pump Down Solenoid Llsv 3 Digital Output
SUPPLY FAN OUTPUT	Digital Output	TB1-2	On / Off	Always	Status of Supply Fan Digital Output
RETURN FAN OUTPUT	Digital Output	TB1-4	On / Off	I/O Board	Status of Return Fan Digital Output
EXHAUST FAN OUTPUT	Digital Output	TB1-4	On / Off	I/O Board	Status of Exhaust Fan or Return Fan Digital Output
VAV HEAT RELAY	Digital Output	TB1-12	On / Off	I/O Board	Status of Digital Output for VAV Heat Relay
FAN FAULT	Digital Output	TB1-6	Okay / Faulted	I/O Board	Digital Output that is Generated when there is a Supply Fan Fault
COOL/HEATING FAULT	Digital Output	TB1-8	On / Off	I/O Board	Digital Output that is Generated when there is a Cooling/Heating Fault
SENSOR/MISC FAULT	Digital Output	TB1-10	On / Off	I/O Board	Digital Output that is Generated when there is a Sensor/Misc Fault
SUPPLY FAN VFD SPEED	Analog Output	TB9-1	0–10 Volts DC	I/O Board	Analog Output to Supply Fan VFD
EXHAUST DAMPER POSITION	Analog Output	TB9-7	0–10 Volts DC	I/O Board	Analog Output to Exhaust Damper
EXHAUST / RETURN FAN VFD	Analog Output	TB9-3	0–10 Volts DC	I/O Board	Analog Output to Exhaust or Return Fan VFD
OA DAMPER POSITION	Analog Output	TB9-5	0–10 Volts DC	I/O Board	Analog Output to Economizer Dampers
HEATING VALVE	Analog Output	TB9-9	0–10 Volts DC	I/O Board	Analog Output to Heating Valve
SUPPLY AIR TEMP CURRENT	Analog Input	J1-1	0–5 Volts	I/O Board	Analog Input from Supply or Mixed Air Sensor
MX SUPPLY AIR TEMP CURRENT	Analog Input	J1-1	0–5 Volts	I/O Board	Analog Input from Supply or Mixed Air Sensor

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
HEAT ENTERING TEMP	Analog Input	J1-2	0–5 Volts	I/O Board	Analog Input from Temperature Sensor Positioned before Heat Section
OUTSIDE AIR TEMP	Analog Input	J2-1	0–5 Volts	I/O Board	Analog Input from Outdoor Air Temperature Sensor
RETURN AIR TEMP CURRENT	Analog Input	J2-2	0–5 Volts	I/O Board	Analog Input from Return Air Temperature Sensor
OUTSIDE AIR HUMIDITY	Analog Input	J2-3	0–5 Volts	I/O Board	Analog Input from Outdoor Air Humidity Sensor
RETURN AIR HUMIDITY	Analog Input	J2-4	0–5 Volts	I/O Board	Analog Input from Return Air Humidity Sensor
TEMPERATURE SUCTION 1	Analog Input	J3-1	0–5 Volts	I/O Board	Analog Input from System 1 Suction Line Temperature Sensor
TEMPERATURE SUCTION 2	Analog Input	J3-2	0–5 Volts	I/O Board	Analog Input from System 2 Suction Line Temperature Sensor
TEMPERATURE SUCTION 3	Analog Input	J3-3	0–5 Volts	I/O Board	Analog Input from System 3 Suction Line Temperature Sensor
PRESSURE SUCTION 1	Analog Input	J3-4	0–5 Volts	I/O Board	Analog Input from System 1 Suction Pressure Transducer
PRESSURE SUCTION 2	Analog Input	J4-1	0–5 Volts	I/O Board	Analog Input from System 2 Suction Pressure Transducer
PRESSURE SUCTION 3	Analog Input	J4-2	0–5 Volts	I/O Board	Analog Input from System 3 Suction Pressure Transducer
PRESSURE DISCHARGE 1	Analog Input	J4-3	0–5 Volts	I/O Board	Analog Input from System 1 Discharge Pressure Transducer
PRESSURE DISCHARGE 2	Analog Input	J4-4	0–5 Volts	I/O Board	Analog Input from System 2 Discharge Pressure Transducer
PRESSURE DISCHARGE 3	Analog Input	J4-5	0–5 Volts	I/O Board	Analog Input from System 3 Discharge Pressure Transducer
CO_2 LEVEL OUTSIDE	Analog Input	J5-2	0–5 Volts	I/O Board	Analog Input of Outdoor CO_2 Sensor
CO_2 LEVEL INSIDE	Analog Input	J5-3	0–5 Volts	I/O Board	Analog Input from Indoor CO_2 Sensor
RETURN FAN PRESS CURRENT	Analog Input	J6-1	0–5 Volts	I/O Board	Analog Input from Return Fan Pressure Transducer
DUCT STATIC PRESS CURRENT	Analog Input	J6-2	0–5 Volts	I/O Board	Analog Input from Supply Air Pressure Transducer
BUILDING PRESSURE CURRENT	Analog Input	J6-3	0–5 Volts	I/O Board	Analog Input from Building Pressure Transducer
OA FLOW INPUT 1	Analog Input	J6-4	0–4095 A/D Counts (1–5 Volts)	I/O Board	Air Flow Input from TEK-Air Measuring Station
OA FLOW INPUT 2	Analog Input	J6-5	0 To 4095 A/D Counts (1–5 Volts)	I/O Board	Air Flow Input from TEK-Air Measuring Station
OA FLOW PRESSURE 1	Analog Input	J6-4	0.0–0.25 iwg (0–5 Volts)	I/O Board	Analog Input from Air Measuring Station Pressure Transducer
OA FLOW PRESSURE 2	Analog Input	J6-5	0.0–0.25 iwg (0–5 Volts)	I/O Board	Analog Input from Air Measuring Station Pressure Transducer
OA FLOW VELOCITY 1	Analog Input	J6-4	0–2002 FPM (0–5 Volts)	I/O Board	Analog Input from Air Measuring Station Pressure Transducer

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
OA FLOW VELOCITY 2	Analog Input	J6-5	0–2002 FPM (0–5 Volts)	I/O Board	Analog Input from Air Measuring Station Pressure Transducer
ZONE TEMP CURRENT	Analog Input	J7-1	0–5 Volts	I/O Board	Analog Input from Zone Temperature Sensor
SUPPLY AIR HUMIDITY	Analog Input	J7-3	0–5 VDC	I/O Board	Displays % RH of Supply Air
SUPPLY AIR TEMP RST	Analog Input	J7-4	0–5 Volts	I/O Board	Hardwired Analog Input to Reset Supply Air Temperature Setpoint
DUCT STATIC PRES RESET	Analog Input	J7-5	0–5 Volts	I/O Board	Hardwired Analog Input to Reset Duct Static Pressure Setpoint
FURNACE STATUS	Analog Input	J5-1	0–5 Volts	I/O Board	Analog Input of Furnace Multiplexer
FURNACE 1A STAT HI	Digital Input	TB01-3	On / Off	Furnace Multiplexer	Furnace 1A Hz Status Input to Furnace Multiplexer Board
FURNACE STATUS COUNTS	Analog Input	J5-1	0–4095	I/O Board	Status of Input from Furnace Multiplexer Board In Count
FURNACE 1 STATUS	Digital Input	TB01-2	On / Off	Furnace Multiplexer	Furnace 1 Status Input to Furnace Multiplexer Board
FURNACE 1A STATUS	Digital Input	TB01-2	On / Off	Furnace Multiplexer	Furnace 1A Status Input to Furnace Multiplexer Board
FURNACE 1B STATUS	Digital Input	TB01-6	On / Off	Furnace Multiplexer	Furnace 1B Status Input to Furnace Multiplexer Board
FURNACE 2 STATUS	Digital Input	TB01-3	On / Off	Furnace Multiplexer	Furnace 2 Status Input to Furnace Multiplexer Board
FURNACE 3 STATUS	Digital Input	TB01-4	On / Off	Furnace Multiplexer	Furnace 3 Status Input to Furnace Multiplexer Board
OCCUPANCY STATE	Digital Input	TB8-2	Occupied / Unoccupied	I/O Board	Hardwired Digital Input to Put Unit Into OCC Mode
LOCAL STOP	Digital Input	TB8-1	Run / Stop	I/O Board	Digital Input that Turns Unit On and Off
FAN (G)	Digital Input	TB8-8	On / Off	I/O Board	Hardwired Digital Input to Turn Supply Fan On and Off
Y1 LOW COOL	Digital Input	TB8-10	On / Off	I/O Board	Hardwired Digital Input to Place Unit in First Stage Cooling Mode
Y2 HIGH COOL	Digital Input	TB8-11	On / Off	I/O Board	Hardwired Digital Input to Place Unit in Second Stage Cooling Mode
W1 LOW HEAT	Digital Input	TB8-13	On / Off	I/O Board	Hardwired Digital Input to Place Unit in First Stage Heating Mode
W2 HIGH HEAT	Digital Input	TB8-14	On / Off	I/O Board	Hardwired Digital Input to Place Unit in Second Stage Heating Mode
SAFETY INPUT CHAIN 1	Digital Input	TB7-1	Okay / Faulted	I/O Board	Digital Input from Compressor System 1 Safety Circuit
SAFETY INPUT CHAIN 2	Digital Input	TB7-2	Okay / Faulted	I/O Board	Digital Input from Compressor System 2 Safety Circuit
SAFETY INPUT CHAIN 3	Digital Input	TB7-4	Okay / Faulted	I/O Board	Digital Input from Compressor System 3 Safety Circuit
SAFETY INPUTS LPCO 1	Digital Input	TB7-5	Okay / Faulted	I/O Board	Digital Input from Compressor System 1 Low Pressure Safety Circuit

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
SAFETY INPUTS LPCO 2	Digital Input	TB7-7	Okay / Faulted	I/O Board	Digital Input from Compressor System 2 Low Pressure Safety Circuit
SAFETY INPUTS LPCO 3	Digital Input	TB7-8	Okay / Faulted	I/O Board	Digital Input from Compressor System 3 Low Pressure Safety Circuit
SUPPLY FAN OUTPUT	Digital Input	TB7-10	Running / Stopped	I/O Board	Digital Input for Supply Fan Run Verification Circuit
EXHAUST FAN STATUS	Digital Input	TB7-11	Running / Stopped	I/O Board	Digital Input from Exhaust Fan Run Verification Circuit
RETURN FAN STATUS	Digital Input	TB7-11	Running / Stopped	I/O Board	Digital Input from Return Fan Run Verification Circuit
FILTER STATUS	Digital Input	TB7-13	Okay / Change	I/O Board	Digital Input from Dirty Filter Pressure Switch
HW/STEAM FRZ STAT	Digital Input	TB7-14	Okay / Faulted	I/O Board	Digital Input from Hot Water Freezestat
SMOKE PURGE 1	Digital Input	TB8-4	On / Off	I/O Board	Hardwired Digital Input to Place Unit is Smoke Purge 1 Mode
SMOKE PURGE 2	Digital Input	TB8-5	On / Off	I/O Board	Hardwired Digital Input to Place Unit is Smoke Purge 2 Mode
SMOKE PURGE 3	Digital Input	TB8-7	On / Off	I/O Board	Hardwired Digital Input to Place Unit is Smoke Purge 3 Mode
CO2 LVL INSIDE BAS	Commun	PORT P1	User Disable / User Enable	IPU Board	This Item Must be Enabled in Order to Communicate a CO_2 Value to Unit
CO2 LVL INSIDE VALUE BAS	Commun	PORT P1	101–1899 ppm	IPU Board	Inside CO_2 Value Being Communicated to Unit Through BAS
DUCT PRES RESET BAS	Commun	PORT P1	User Disable / User Enable	IPU Board	Item Must be Enabled in Order to Communicate a Duct Static Pressure Reset Value to Unit
DUCT STATIC PRES RESET BAS	Commun	PORT P1	0% to 100%	IPU Board	Duct Static Reset Value Being Communicated to Unit Through BAS
EXHAUST CONTROL BAS	Commun	PORT P1	Enable/Disable	IPU Board	Enables or Disables Control of Exhaust Fan or Modulating Exhaust Damper (Return Fan)
EXHAUST DAMPER/ VFD	Commun	Port P1	0% to 100%	IPU Board	Communicated Signal to Set Position of Modulating Damper (Return Fan) or Speed of Exhaust Fan
FAN (G) BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Fan G Input
MORNING WARM UP CMD	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Morning Warm Up Command
OCCUPANCY COMMAND	Commun	PORT P1	Occupied / Unoccupied	IPU Board	Gives Status of Communicated Occupancy Command
SMOKE PURGE 1 BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Smoke Purge 1 Command
SMOKE PURGE 2 BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Smoke Purge 2 Command
SMOKE PURGE 3 BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Smoke Purge 3 Command

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
SAT RESET BAS	Commun	PORT P1	User Disable / User Enable	IPU Board	This Item Must be Enabled in Order to Communicate a Supply Air Temperature Reset Value to Unit
SUPPLY AIR TEMP RESET BAS	Commun	PORT P1	0–5 Volts	IPU Board	Supply Air Temperature Reset Value Being Communicated to Unit Through BAS
SYSTEM STOP	Commun	PORT P1	0 - Allows All Compressors To Operate; 1 - Turns Off Compressor System 1; 2 - Turns Off Compressor System 2; 3 - Turns Off Compressor System 3	IPU Board	Gives Status of Communicated System Stop Command
UNIT STOP	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Unit Stop Command
W1 LOW HEAT BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated W1 Low Heat Command
W2 HIGH HEAT BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated W2 High Heat Command
Y1 LOW COOL BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Y1 Low Cool Command
Y2 HIGH COOL BAS	Commun	PORT P1	On / Off	IPU Board	Gives Status of Communicated Y2 High Cool Command
ZONE TEMP BAS	Commun	PORT P1	-20.0–180.0°F	IPU Board	Gives Actual Value of Communicated Zone Temperature
FIRMWARE CRC	Derived		0–99999	Always	Size of Code in Software: This is Not for Field Use
REAL TIME UI - PEAK 5 SEC AND AVERAGE	Derived				Average and Peak Over Last 5 Seconds Time Used by User Interface: This is Not for Field Use
REAL TIME UI - LOST AND PEAK	Derived				Lost and Peak Time Used by User Interface: This is Not for Field Use
REAL TIME CONTROL - PEAK 5 SEC AND AVERAGE	Derived				Average and Peak Over Last 5 Seconds Time Used by Control: This is Not for Field Use
REAL TIME CONTROL - LOST AND PEAK	Derived				Lost and Peak Time Used by Control: This is Not for Field Use
DE MODIFIER ADDRESS			-1 to 41943		Used to Enter a Specific DE Instance: See *Connecting BAS to a Unit with the IPU Controller on page 133*
DE MODIFIER OFFSET			-1 to 99		Used in Combination with DE Modifier Address to Enter a Specific DE Instance: See *Connecting BAS to a Unit with the IPU Controller on page 133*

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
P1 BAUD RATE			1200, 4800, 9600, 19200, 38400, 76800		Establishes Communication Baud Rate for Port 1
P1 MANUAL MAC ADDRESS			-1 to 127		Allows Manual Entrance of MAC Address for Port 1: See See *Connecting BAS to a Unit with the IPU Controller on page 133*
P1 PARITY			None, Even, Odd, Ignore		Do Not Change from Default Value for BACnet
P1 PROTOCOL			BACnet, API		Keep Setting on BACnet.
P1 STOP BITS			1–2		Do Not Change from Default Value for BACnet
P2 BAUD RATE			1200, 4800, 9600, 19200, 38400, 57600		Establishes Communication Baud Rate for Port 2
P2 MANUAL MAC ADDRESS			-1 to 127		Allows Manual Entrance of MAC Address for Port 2: See *Connecting BAS to a Unit with the IPU Controller on page 133*
P2 PARITY			None, Even, Odd, Ignore		Establishes Parity for Communication Port 2
P2 PROTOCOL			Terminal, Modbus I/O, Modbus Server, API, Modbus Client		Establishes Protocol for Communication Port 2
P2 STOP BITS			1–2		Establishes Stop Bit Setting for Communication Port 2
P3 BAUD RATE			1200, 4800, 9600, 19200, 38400, 57600		Establishes Communication Baud Rate for Port 3
P3 MANUAL MAC ADDRESS			-1 to 127		Allows Manual Entrance of MAC Address for Port 3: See See *Connecting BAS to a Unit with the IPU Controller on page 133*
P3 PARITY			None, Even, Odd, Ignore		Establishes Parity for Communication Port 3
P3 PROTOCOL			Terminal, Modbus I/O, Modbus Server, Api, Modbus Client		Establishes Protocol for Communication Port 3
P3 STOP BITS			1 - 2		Establishes Stop Bit Setting for Communication Port 3
P4 BAUD RATE			1200, 4800, 9600, 19200, 38400, 57600		Establishes Communication Baud Rate for Port 4
P4 MANUAL MAC ADDRESS			-1 to 127		Allows Manual Entrance of MAC Address for Port 4: See See *Connecting BAS to a Unit with the IPU Controller on page 133*

TABLE 40–SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
P4 PARITY			None, Even, Odd, Ignore		Establishes Parity for Communication Port 4
P4 PROTOCOL			Terminal, Modbus I/O, Modbus Server, API, Modbus Client		Establishes Protocol for Communication Port 4
P4 STOP BITS			1–2		Establishes Stop Bit Setting for Communication Port 4
CONNEXSYS ERROR FEATURE AND DETECTION	Derived				Not for Field Use
CONNEXSYS ERROR PAGE AND FIELD	Derived				Not for Field Use
CONNEXSYS ERROR REASON AND VALVE	Derived				Not for Field Use
REAL TIME PROBLEM STRING	Derived				Not for Field Use
REAL TIME PROBLEM NUMBER	Derived				Not for Field Use
REAL TIME PROBLEM	Derived				Not for Field Use

Following is an example of an ANALOG Input display that can be viewed from Service Mode. See *Table 40 on page 123* for a listing of the Analog Inputs.

```
SERVICE AI    PIO    J07-01    XX.X VDC
+ BUILDING STATIC PRES          =XX.XXINWC
```

Following is an example of a DIGITAL Input display that can be viewed from Service Mode. See *Table 40 on page 123* for a listing of the DIGITAL Inputs.

```
SERVICE   DI  PIO  TB08-01
   LOCAL STOP            RUN
```

Following is an example of a DIGITAL Output display that can be viewed from Service Mode. The XXX is replaced with OFF or ON in this section. See *Table 40 on page 123* for a listing of the Digital Outputs.

```
SERVICE      DO   PIO  TB03-05
   COMPRESSOR 2A         OFF
```

Following is an example of an ANALOG Output display that can be viewed from Service Mode. See *Table 40 on page 123* for a listing of the Analog Outputs.

```
SERVICE  AO   PIO    TB08-01     XX.X VDC
+ SYS 1 FEED VALVE OUTPUT       =XXX.X %
```

HISTORY

The HISTORY key gives the user access to WARNING and FAULT information. Many operating parameters and states are saved at the time of a fault. The History information can be viewed after entering the Level 2 password.

HISTORY key pressed

WARNING 1	WARNING 2	FAULT 1	FAULT 2	FAULT 3
		Fault 1 Data	Fault 2 Data	Fault 3 Data

When the HISTORY key is pressed, the first active warning will be displayed. If there are not any active warnings, HISTORY 1 is displayed. If there are not any faults, "NO FAULT" will be displayed. Data is not saved for warnings. Data is saved for faults.

When a warning is displayed, the ► key advances to the next warning or HISTORY 1 after the last warning. The ◄ key returns to the previous warning or the highest HISTORY number before the first warning.

When a HISTORY # is displayed, the ► key advances to the next HISTORY # or warning 1 after the last fault. The ◄ key returns to the previous HISTORY # or the highest warning number before the first fault. Buffer number 1 is the most recent and buffer number 10 is the oldest HISTORY # saved. A maximum of 10 HIS-

TORY #s are saved. The ▲ and ▼ key can be used to scroll forwards and backwards through the history buffer data.

The data following the initial History Fault display, is displayed in the same order and with the same message used under the respective menu function:

- Status
- Unit Data
- Cooling
- Supply System
- Comp Sys 1
- Comp Sys 2
- Comp Sys 3
- Heating
- Economizer
- Ventilation
- Exhaust
- Hours/Starts

Pressing the ▼ key from a History Fault display changes the display to the History Section display format. The ► and ◄ keys are used to select a section. Pressing the History or **X** key returns to the History Fault display. Pressing the ▼ key displays the next parameter in the selected list. From a parameter display, pressing the History or **X** key returns to the History Fault display. See *Navigation Keys on page 106* for instructions for navigating the parameter display.

For the following example, assume that there were three faults and one warning logged.

First, the HISTORY key is pressed to get the password prompt. If a level 2 password is active, this prompt is skipped.

```
HISTORY
ENTER PASSWORD
```

After entering the Level 2 password, the most recent WARNING is displayed.

```
HISTORY WARNING                ◄►
+ WRN-BUILDING PRS
```

The ► key is pressed to move to the first fault.

```
HISTORY 01  31 OCT 2004  12:45:59 AM ◄►
+ LOCKOUT-DUCT PRS XDCR
```

The ► key is pressed to move to the next older fault (fault # 2).

```
HISTORY 02  31 OCT 2004  10:42:39 AM ◄►
 AUTO RESET-MSAT SENSOR
```

The ► key is pressed to move to the next older fault (fault # 3).

```
HISTORY 03  30 OCT 2004  02:11:23 PM ◄►
 WRN-BUILDING PRS
```

The ▼ key is pressed to view data saved when fault #3 was detected.

```
HISTORY 03–STATUS              ◄►
UNIT-OVERALL STATUS        RUN
```

The ▼ key is pressed to view the second STATUS value.

```
HISTORY 03–STATUS              ◄►
 CURRENT OPER MODE   RUN
```

The ► key is pressed to change to the next data section (UNIT DATA).

```
HISTORY 03–UNIT DATA           ◄►
 UNIT TYPE          VARIABLE AIR VOLUME
```

The **X** or HISTORY key is pressed to go back to the fault display.

```
HISTORY 03  30 OCT 2004  02:11:23 PM ◄►
 WRN-BUILDING PRS
```

From fault display, the **X** key can be pressed to return to the Power Up Banner display.

PASSWORD

Passwords are used to allow restricted access to the modification and viewing of certain parameters using the Setpoints, Program, Options, Date/Time, Schedule, Operating Hours / Start Counter, Print, Service, and History menu keys. The menus activated by each of these buttons can only be viewed after an acceptable password is entered. Each parameter is associated with a level of access. Each level of access is associated with a specific password. The access levels available are: Level 1 or Level 2.

- If a parameter is tagged as Level 1, password of 9675 must be entered in order to change the value.

- If a parameter is tagged as Level 2, a password of 9725 must be entered in order to change the value. Entering the Level 2 password will also allow the changing of a Level 1 parameter.

Pressing Setpoints, Program, Options, Date/Time, Schedule, Operating Hours / Start Counter, Print, Service, or HISTORY key will take the user to the log-in prompt. When the user is first presented with the login prompt, the password field will be blank. If the user wishes to change Level 1 or Level 2 parameters, the user must know the appropriate password. At that point, only the parameters changeable under the specific password level will be displayed. For example, if the user presses the Options menu key, and then enters a Level 1 password, the user will be presented with a list of option parameters that have been tagged as Level 1. If the user enters a level 2 password, all parameters are displayed.

The password is entered by pressing the correct sequence of numerical keys (the 0 key through the 9 key), then pressing the ✓ key. As digits are entered, asterisks will be placed in the password field. Once entered, the menu system will compare the password to a list of stored passwords. If the entered password matches one of the stored passwords, the user is allowed access at the specified level, and the display will show the first applicable parameter of the menu list, with the appropriate edit prompts. If the password is not correct, the screen will display “Password Incorrect” for two seconds and then revert back to the Login Prompt. Pressing the X key during password entry will cancel the password entry process and take the user back to the Login Prompt.

Once a password has been accepted, reentry of that password will not be required until either the user presses a menu key other than Setpoints, Program, Options, Date/Time, Schedule, Operating Hours / Start Counter, Print, Service, History or key activity is idle for fifteen minutes. This ensures that the menu system reverts to password protection within an acceptable timeout.

POWER UP BANNER

When power is first applied to the control panel, the following message will be displayed for two seconds:

The top line displays the copyright message. The bottom line displays the software version, and the present date and time.

The software version number will be in the following format:

- C.ECO.ZZ.YY (control board released version).
- Where C is the Product Classification and stands for Commercial unit.
- ECO is the Family Code and stands for YORK® 120–150 rooftop unit packaged rooftop air conditioner Control Panel.
- ZZ = the Product Code.
- YY = the Version Number.

CONNECTING BAS TO A UNIT WITH THE IPU CONTROLLER

A rooftop unit with the IPU controller ships from the factory ready to connect and communicate with a Building Automation System utilizing BACnet MS/TP protocol.

The unit can also communicate via BACnet IP, LON or N2 with the addition of a field provided/installed component.

BACNET MS/TP

- Communication wires MUST be connected to Port 1 using only terminals 3 and 4. Connecting wires to any of the other terminals could result in erratic or no communication. (See *Figure 49 on page 134*.)
  a. Terminal 3: Receive (-)
  b. Terminal 4: Transmit (+)
- MAC address can be set using dip switch SW2 or in the SERVICE Key. Preferred method is through the SERVICE Key. This prevents someone accidentally hitting a dipswitch key and changing the MAC address
- Using the SERVICE key to set the MAC address:
  a. Press the SERVICE key on the keyboard.
  b. Enter the level 2 password, 9725, and press the ✓.
  c. The screen should display “Data Log Format.” If not, press the SERVICE key again, and “Data Log Format” should appear.
  d. Use the ▲ key to scroll up through the menu until the screen displays “P1 Stop Bits =1.”

e. This is the part of the menu for Port 1.

f. Press the ▲ key again to "P1 Protocol." Should be set to BACnet.

g. Use the ▲ key again until the screen displays "P1 Manual Mac Address." If the value is set to -1, the unit address is set by the dipswitches. Press the ✓ and enter the MAC address for the unit using the numbered section of the keypad, then press the ✓ to accept this value.

h. Use the ▲ key again to find the "P1 Baud Rate." Set this value to the required Baud Rate.

i. Press the **X** key on the keypad to exit the programming menu.

j. Cycle main power OFF then ON for new values to be locked in.

- The unit is now ready to communicate to the BAS

BACNET IP

- Since the IPU controller does not have a functional IP port, a gateway must be used
- We recommend using a JCI NCE (MS-NCE2560-0)
- The gateway will be connected to Port 1 on the IPU controller like below (See *Figure 49 on page 134*)

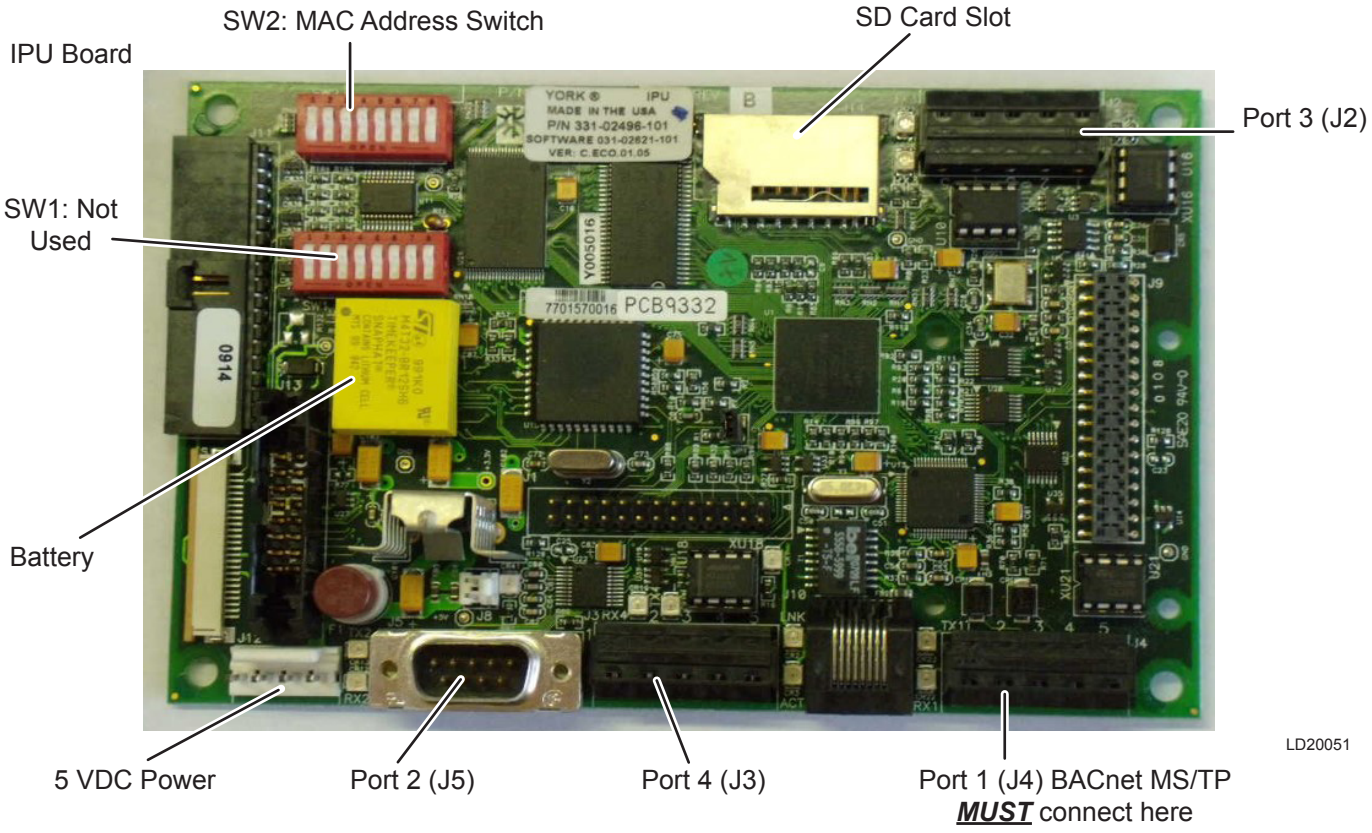
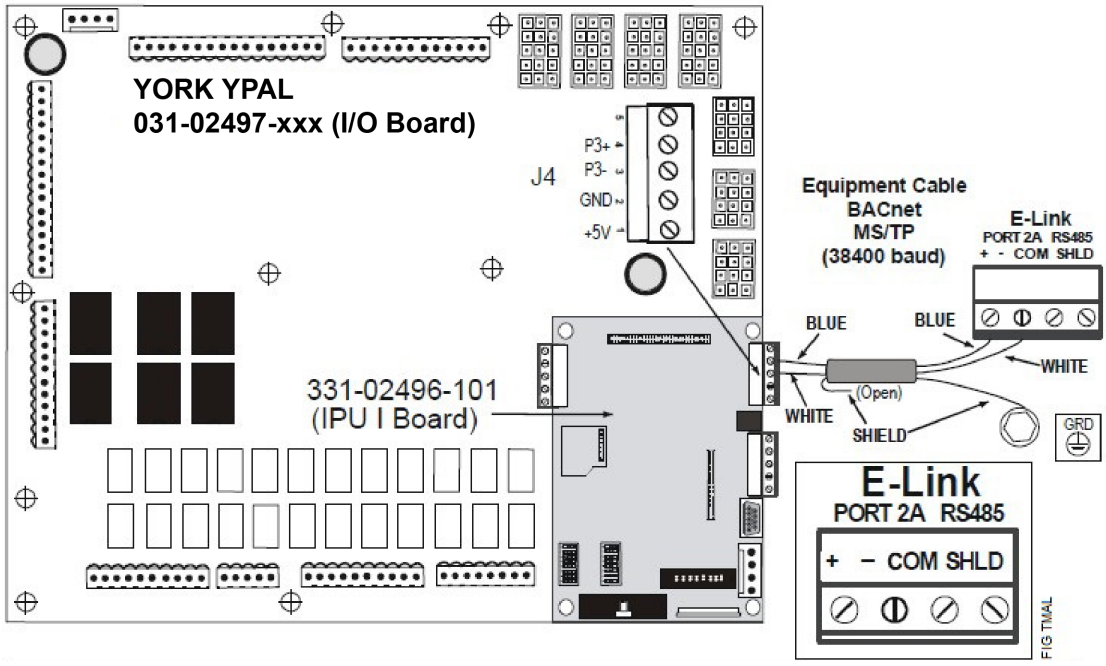


FIGURE 53 - IPU CONTROL BOARD

LON

- To communicate to a BAS utilizing LON protocol, an E-Link must be used:
  a. YK-ELNK101-0
  b. YK-ELNKE01-1 (with enclosure)
- The wires from the E-Link to the IPU controller will be connected to Port 1 (see *Figure 49 on page 134*)
- P1 Protocol set to BACnet: see above under BACnet MS/TP to locate P1 Protocol in the Service Menu

See *Figure 50 on page 135* for addressing the E-Link to the IPU Controller.



LD27930

YORK 120–150 rooftop unit Setup for MS/TP Bus:
DE Modifier Address set to 50.
DE Modifier Offset set to -1.
P1 Protocol set to BACnet.
P1 Manual MAC Address set to -1.
P1 Baud Rate st to 38400.
P1 Parity set to None.
P1 Stop Bits set to 1.
MAC Address Switch (SW2) set 1 ON, all others OFF.
Note: Do not set the chiller address and the E-Link address to the same value. This causes a conflict on the MS/TP Bus resulting in no communication between the chiller IPU I board and the E-Link Gateway.

FIGURE 54 - E-LINK CONNECTIONS AND ADDRESSING INSTRUCTIONS

N2

- To communicate to a BAS utilizing N2, an E-Link must be used
  a. YK-ELNK100-0
  b. YK-ELNKE00-0 (with enclosure)
- The wires from the E-Link to the IPU controller will be connected to Port 1 (see *Figure 49 on page 134*)
- P1 Protocol set to BACnet: see above under BACnet MS/TP to locate P1 Protocol in the Service Menu

See *Figure 50 on page 135* for addressing the E-Link to the IPU Controller.

OTHER PROTOCOLS

- The IPU controller is also capable of communicating with other BAS protocols:
  a. MODBUS Server
  b. MODBUS Client
  c. MODBUS I/O
  d. Terminal
  e. API

END OF LINE TERMINATION

- While it is not always required to have End-of-Line Termination, it is strongly recommended.
- For BACnet MS/TP and N2 protocols, YORK factory recommends using our End-Of-Line Terminator, p/n: MS-BACEOL-0.
- Other communication protocols may need to provide/install their own end-of-line terminators if applicable.

MISCELLANEOUS

- Whenever a change is made to a communication setting, please cycle power on/off to the unit to “lock in” the new setting.
- Points list are available in *Table 41 on page 137* for BACnet MS/TP, BACnet IP, and MODBUS.

TECHNICAL SUPPORT

- For technical support on connecting to and communicating with the IPU controller in the YORK 120–150 ton rooftop unit, please contact Product Technical Support
  - 1-877-329-7430, Option 2
  - applieddxtechsupport@jci.com

TABLE 47 - BACNET MS/TP, MODBUS, BACNET IP

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
ACT_DSP_SP	Duct Static Press Active Sp	R	AI01	514	Displays The Active Duct Static Press SP
ACT_MIN_ FLOW	Active Minimum Airflow	R	AI02	515	Displays The Min Ventilation Air (CFM) SP when Unit has an Air Flow Monitoring Station
ACT_MIN_POS	Active Minimum Position	R	AI03	516	Displays Min OA Damper Position (%) when Unit is Fixed Min Vent Control
ACT_SAT_SP	Active Supply Air Temp Sp	R	AI04	517	Displays Active Supply Air Temp SP
AMORN_WA_ ACT	Adaptive Morning Warmup Status **(Only Used with Internal Time Clock)**	R	BI01		Displays Status of Adaptive Morning Warm-Up
BLD_STAT_ PRS	Building Pressure Current	R	AI05	518	Displays Current Building Press (iwg)
BULD_PRES_ SP	Bldg Press SP	R/W	AV01	1026	Displays Active Building Pressure SP
CO2_1_OUT	CO_2 Level Of The Outside Air	R	AI07	520	Displays Actual OA Air CO_2 (ppm)
CO2_2_IN	CO_2 Level Of The Inside Air	R	AI08	521	Displays Actual RA Air CO_2 (ppm)
CO2_INSIDE	CO_2 Lvl Inside Value BAS	R/W	AV43	1168	BAS Entered Value for Inside CO_2 Level. "CO_2 Lvl Inside BAS" Must be Enabled Using SERVICE Key in Order to Use this Point
CO2_OFFSET	CO_2 Offset SP	R/W	AV02	1027	Displays Value (ppm) that Indoor CO_2 Must Rise Above Outside CO_2 to Activate Demand Ventilation
COL/HEAT_FLT	Cooling/Heating Fault Status	R	BI02	1283	Displays Status of Cooling of Heating System: 0=No Fault 1=Fault
COMFORT_ VENT	Comfort Ventilation **(SZVAV)**	R/W	AV78 BV02	1103	Displays Status of Comfort Vent Option and Allow it to be Turned On/ Off: 0=Off 1=On
COMP_1A	Compressor 1A Status	R	BI03	1284	Displays Status of Comp 1A: 0=Off 1=On
COMP_1A_ OPER	Comp 1A Operating Hrs	R	AI09	522	Displays Operating Hrs of Comp 1A
COMP_1B	Compressor 1B Status	R	BI04	1285	Displays Status of Comp 1B: 0=Off 1-On
COMP_1B_ OPER	Comp 1B Operating Hrs	R	AI10	523	Displays Operating Hrs of Comp 1B
COMP_2A	Compressor 2A Status	R	BI05	1286	Displays Status of Comp 2A: 0=Off 1=On
COMP_2A_ OPER	Comp 2A Operating Hrs	R	AI11	524	Displays Operating Hrs of Comp 2A
COMP_2B	Compressor 2B Status	R	BI06	1287	Displays Status of Comp 2B: 0=Off 1=On

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
COMP_2B_ OPER	Comp 2B Operating Hrs	R	AI12	525	Displays Operating Hrs of Comp 2B
COMP_3A	Compressor 3A Status **(70-150 Ton Only)**	R	BI07	1288	Displays Status of Comp 3A: 0=Off 1=On
COMP_3A_ OPER	Comp 3A Operating Hrs **(70-150 Ton Only)**	R	AI13	526	Displays Operating Hrs of Comp 3A
COMP_3B	Compressor 3B Status **(70-150 Ton Only)**	R	BI08	1289	Displays Status of Comp 3B: 0=Off 1=On
COMP_3B_ OPER	Comp 3B Operating Hrs **(70-150 Ton Only)**	R	AI14	527	Displays Operating Hrs of Comp 3B
COMP_ LPCO_1	Safety Input Lpco Ckt 1 Status	R	BI09	1290	Displays Status of Low Press Switch on Ckt 1: 0=Normal (OKAY) 1=Fault(ed)
COMP_ LPCO_2	Safety Input Lpco Ckt 2 Status	R	BI10	1291	Displays Status of Low Press Switch on Ckt 2: 0=Normal (OKAY) 1=Fault(ed)
COMP_ LPCO_3	Safety Input Lpco Ckt 3 Status **(70-150 Ton Only)**	R	BI11	1292	Displays Status of Low Press Switch on Ckt 3: 0=Normal (OKAY) 1=Fault(ed)
COMP_STAT_1	Safety Chain Ckt 1 Status	R	BI12	1293	Displays Status of Ckt 1 Safety Chain: 0=Normal (OKAY) 1=Fault(ed)
COMP_STAT_2	Safety Chain Ckt 2 Status	R	BI13	1294	Displays Status of Ckt 2 Safety Chain: 0=Normal (OKAY) 1=Fault(ed)
COMP_STAT_3	Safety Chain Ckt 3 Status **(70-130 Ton Only)**	R	BI14	1295	Displays Status of Ckt 3 Safety Chain: 0=Normal (OKAY) 1=Fault(ed)
COND_FAN_1A	Cond Fan 1A/1 Status	R	BI15	1296	Displays Status of Cond Fan 1A/1: 0=Off 1=On
COND_FAN_1B	Cond Fan 1B/2 Status	R	BI16	1297	Displays Status of Cond Fan 1B/2: 0=Off 1=On
COND_FAN_2A	Cond Fan 2A/3 Status	R	BI17	1298	Displays Status of Cond Fan 2A/3: 0=Off 1=On
COND_FAN_2B	Cond Fan 2B/4 Status	R	BI18	1299	Displays Status of Cond Fan 2B/4: 0=Off 1=On
COND_FAN_3A	Cond Fan 3A/5 Status **(70-150 Ton Only)**	R	BI19	1300	Displays Status of Cond Fan 3A/5: 0=Off 1=On
COND_FAN_3B	Cond Fan 3B/6 Status **(70-150 Ton Only)**	R	BI20	1301	Displays Status of Cond Fan 3B/6: 0=Off 1=On
COND_FAN_ SPD	Cond Fan Speed	R	AI15	528	Not Used at This Time; For Future Use
CONTINU_ VENT	Continuous Ventilation **(SZVAV)**	R/W	AV79 BV03	1104	Displays Status of Continuous Ventilation Option and Allows for it to be Turned On/Off: 0=Off 1=On

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
DCT_ST_PR_ RT	Duct Static Press Reset	R	AI16	529	Displays Status of Hardwired Duct Static Reset Value to CTB1 (%)
DCT_STAT_ PRS	Duct Static Press Current **(VAV)**	R	AI17	530	Displays Actual Duct Static Press. (iwg)
DSP_HI_LIMIT	Duct Static Reset High SP **(VAV)**	R/W	AV03	1028	Displays Duct Static High SP
DSP_LO_LIMIT	Duct Static Reset Low SP **(VAV)**	R/W	AV04	1029	Displays Duct Static Low SP
DSP_RST_BAS	Duct Static Press Reset BAS **(VAV)**	R/W	AV05	1030	BAS Value that Causes Reset of Duct Static Press SP Between to High and Low Values. "Duct Pres Rst BAS" Must be Enabled Through SERVICE Key to Use this Point
ECON_ME_ USED	Econ Method Active	R	AI18	531	Displays Status of Active Economizer Mode: 1=Dry Bulb 2=Single Enthalpy 3=Dual Enthalpy 4=Best Method Avail
ECON_STATUS	Econ System Status	R	AI19	532	Displays Status of Economizer: 1=Installed and Active 2=Not Installed 3=Disabled
ECONO_ INSTAL	Economizer System	R/W	AV81 BV05	1106	Allows Economizer Feature to be Turned On/Off: 0=Off 1=On
ECONO_ METHOD	Econ Method to Use	R/W	AV06	1031	Allows for Selection of Economizer Method to Use: 1=Dry Bulb 2=Single Enthalpy 3=Dual Enthalpy 4=Best Method Avail
EXH_DAMPER/ VFD	Exhaust Damper BAS Control	R/W	AV52	NA*	Allows for Control of Exhaust Fan Speed or Modulating Damper (Return Fan). 0 To 100% for Both Applications.
EXH_FAN_ STAT	Exhaust Fan Status	R	BI21	1302	Displays Status of Exhaust Fan Proving Circuit: 0=Open 1=Closed
EXHAUST_FAN	Exhaust Fan Output Status	R	BI22	1303	Displays Status of Exhaust Fan Output: 0=Off 1=On
EXHAUST_ OUT	Exhaust Damper Position	R	AI21	534	Displays Control Output to Exh Damper (%)
FAN_FAULT	Fan Fault Status	R	BI23	1304	Displays Status of Supply, Exhaust or Return Fan Fault: 0=No Fault 1=Fault
FAN_G	Fan (G) Status	R	BI24	1305	Displays Status of Fan (G) Input; Either Hardwired (Ctb1) or Communicated (BAS): 0=Off 1=On
FAN_G_BAS	Fan (G) BAS	R/W	AV82 BV06	1107	BAS Command that Allows Fan (G) Input to be Turned On/Off: 0=Off 1=On

* Not Available

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
FILTER_STATS	Filter Status	R	BI25	1306	Displays The status of the Dirty Filter Input: 0=Normal (OKAY) 1=Fault (CHANGE)
FURN_OUT_1	Elect Heat Stage 1 Status Staged Gas Furn 1 Lo Status Mod Gas Furn 1A Low Status	R	BI26	1307	Displays Status of Control Output to Indicated Heat Section: 0=Off 1=On
FURN_OUT_2	Elect Heat Stage 2 Status Staged Gas Furn 1 High Status Mod Gas Furn 1A High Status	R	BI27	1308	Displays Status of Control Output to Indicated Heat Section: 0=Off 1=On
FURN_OUT_3	Elect Heat Stage 3 Status Staged Gas Furn 2 Low Status Mod Gas Furn 2 Low Status	R	BI28	1309	Displays Status of Control Output to Indicated Heat Section: 0=Off 1=On
FURN_OUT_4	Elect Heat Stage 4 Status Staged Gas Furn 2 High Status Mod Gas Furn 2 High Status	R	BI29	1310	Displays Status of Control Output to Indicated Heat Section: 0=Off 1=On
FURN_OUT_5	Elect Heat Stage 5 Status Staged Gas Furn 3 Low Status Mod Gas Furn 3 Low Status	R	BI30	1311	Displays Status of Control Output to Indicated Heat Section: 0=Off 1=On
FURN_OUT_6	Elect Heat Stage 6 Status Staged Gas Furn 3 High Status Mod Gas Furn 3 High Status	R	BI31	1312	Displays Status of Control Output to Indicated Heat Section: 0=Off 1=On
FURN_OUT_7	Elect Heat Stage 7 Status Mod Gas Furn 1B Status	R	BI32	1313	Displays Status of Control Output to Indicated Heat Section: 0=Off 1=On
HEAT_ENABLE	Heating System	R/W	AV83 BV07	1108	BAS Command that Allows Heating Function to be Turned On/Off: 0=User Disabled 1=User Enabled
HEAT_ENT_ TEMP	Heat Entering Temp	R	AI22	535	Displays Actual Temp of Air Entering Elect, Staged Gas, or Mod Gas Heat Sections

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
HEAT_STAGES	Electric Heat Stages or Gas Heat Stages	R	AI23	536	Displays Number of Elect or Staged Gas Heat Stages Available
HEAT_ VACTION	HW Valve Action	R/W	AV84 BV08	1109	BAS Command that Allows Hot Water/Steam Valve Action to be Changed: 0=Direct 1=Reverse
HEATING_SAT	Heating Supply Sir Temp SP **(VAV)**	R/W	AV09	1034	Displays Active Supply Air Temp SP for Heating
HEATING_VLV	Heating Valve	R	AI24	537	Displays Output from Control to a HW/Steam Valve or Mod Gas Heat Valve (%)
HW_FRZ_STAT	Hw/Steam Coil Freezestat Status	R	BI33	1314	Displays Status of Freezestat on Units with HW/Steam Heat: 0=No Fault (OKAY) 1=Faulted
LOCAL_STOP	Local Stop Status	R	BI34	1315	Displays Status of 24Vac Input to Control Board Through SD Terminal and/or Unit On/Off Switch
MAX_FLOW_ DV	Outside Air Max Flow SP	R/W	AV11	1036	Displays Max Airflow for Demand Ventilation with an Airflow Station (CFM)
MECH_LCK_ TMP	Mech Cooling Lockout SP	R/W	AV12	1037	Displays Min OA Temp at which Mech Cooling is Allowed to Operate
MIN_FLOW_DV	Outside Air Min Flow SP	R/W	AV13	1038	Displays Min Airflow for Demand Ventilation with an Airflow Station (CFM)
MIN_OA_FLO	Minimum OA Flow SP	R/W	AV51	1076	Displays Min Outside Airflow Active SP For TEK-air Measuring Station (TEK-air Full IAQ). Ventilation Needs to be User Enabled (CFM)
MORN_WARM_ UP	Morning Warm Up	R/W	AV85 BV09	1110	BAS Command that Allows Morning Warm-Up to be Enabled/Disabled: 0=Enabled 1-Disabled
MORN_WUP_ CMD	Morn Warm Up Command	R/W	AV86 BV10	1111	BAS Command that Starts/Stops Morning Warm-Up: 0=Off 1=On
MORN_WUP_ RAT	Heating Ret Air Temp SP **(VAV)**	R/W	AV15	1040	Displays Active R/A Temp SP for Heating
NIGHT_ SETBAC	Night Setback for Heating	R/W	AV87 BV11	1112	BAS Command that Allows Night Set Back to be Turned On/Off: 0=Off 1=On
OA_DAMP_ POS1	OA Damper Minimum Position	R/W	AV16	1041	Displays Active SP for Min OA Damper when Using Fixed Minimum Ventilation and Supply Fan VFD is at 100%
OA_DAMP_ POS2	OA Damper Maximum Position	R/W	AV17	1042	Displays Max Position F for OA Damper when Using Fixed Minimum Ventilation and Supply Fan for is at 50%
OA_DAMPER	OA Damper Position Current	R	AI25	538	Displays Position of OA Damper (%)

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
OA_ENTH_ LIMIT	OA Enthalpy SP	R/W	AV18	1043	Displays Max Enthalpy SP for Using OA for Cooling (Btu/lb) Single or Dual Enthalpy
OA_ ENTHALPY	OA Enthalpy	R	AI26	539	Displays Current OA Enthalpy (Btu/ lb)
OA_FLO_ PRS_1	OA Flow Press 1	R	AI27	540	Not Used
OA_FLO_ PRS_2	OA Flow Press 2	R	AI28	541	Not Used
OA_FLOW_1	IAQ Damper Air Flows OA Flow 1	R	AI61	574	Displays Air Flow Through a TEK-Air Full IAQ Air Measuring Station (CFM)
OA_FLOW_2	IAQ Damper Air Flows OA Flow 2	R	AI62	575	Not Used
OA_FLOW_ TOTL	OA Flow Total	R	AI63	576	Displays Total Air Flow Through a TEK-Air Full IAQ Air Measuring Station (CFM)
OA_REL_ HUMID	OA Humidity	R	AI29	542	Displays Current OA Relative Humidity (%)
OA_TEMP	OA Temperature	R	AI30	543	Displays Current OA Temp
OAT_HIGH_ SAT	OA Temp SP for Hi Supply Air Temp **(VAV and Only if SAT Reset Method is Outside Air)**	R/W	AV19	1044	Displays OA Temp SP Used for Switching to High Supply Air Temp SP
OAT_LOW_ SAT	OA Temp SP For Lo Supply Air Temp **(VAV and Only if SAT Reset Method is Outside Air)**	R/W	AV20	1045	Displays OA Temp SP Used for Switching to Low Supply Air Temp SP
OCC_MODE	Occupancy Mode Status	R	BI35	1316	Displays Occ/Unocc Status with Hardwired, Communicated, or Internal Clock Schedule Input: (Ena=Enabled/Occ Dis=Disabled/ Unocc)
OCC_STATE	Occupancy State Status	R	BI36	1317	Displays Status of Hardwired Input: (Ena=Enabled/Occ Dis=Disabled/ Unocc)
OCC_ZN_ COOL	OCC Zone Cooling SP	R/W	AV21	1046	Displays Active Occupied Zone Cooling SP
OCC_ZN_HEAT	OCC Zone Heating SP	R/W	AV22	1047	Displays Active Occupied Zone Heating SP
OCCUPNCY_ CMD	Occupancy Command	R/W	AV88 BV12	1113	BAS Command that Allows Unit to be Placed in Occ/Unocc Mode: (0=Unocc 1=Occ)
PRS_1_DISCH	Disch Press Ckt 1	R	AI31	544	Displays Current Disch Press of Ckt 1 (Psig)
PRS_1_SUCT	Suct Press Ckt 1	R	AI32	545	Displays Current Suct Press of Ckt 1 (Psig)

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
PRS_2_DISCH	Disch Press Ckt 2	R	AI33	546	Displays Current Disch Press of Ckt 2 (Psig)
PRS_2_ SUCTION	Suct Press Ckt 2	R	AI34	547	Displays Current Suct Press of Ckt 2 (Psig)
PRS_3_DISCH	Disch Press Ckt 3 **(70-150 Ton Only)**	R	AI35	548	Displays Current Disch Press of Ckt 3 (Psig)
PRS_3_SUCT	Suct Press Ckt 3 **(70-150 Ton Only)**	R	AI36	549	Displays Current Suct Press of Ckt 3 (Psig)
PUMP_DOWN	Pump Down	R/W	AV89 BV13	1114	BAS Command that Allows Pump Down Feature to be Turned On/Off: (0=On 1=Off
PUMP_ DOWN_1	Pump Down Llsv 1 Status	R	BI37	1318	Displays Status of Output to Ckt 1 Liq Line Solenoid Vlv: 0=Pump Down LLSV (OFF) 1=Pump Down LLSV (ON)
PUMP_ DOWN_2	Pump Down Llsv 2 Status	R	BI38	1319	Displays Status of Output to Ckt 2 Liq Line Solenoid Vlv: 0=Pump Down LLSV (OFF) 1=Pump Down LLSV (ON)
PUMP_ DOWN_3	Pump Down Llsv 3 Status **(70-150 Ton Only)**	R	BI39	1320	Displays Status of Output to Ckt 3 Liq Line Solenoid Vlv:0=Pump Down LLSV (OFF) 1=Pump Down LLSV (ON)
RAT_COOL_SP	Cooling Return Air Temp SP **(VAV)**	R/W	AV23	1048	Displays Active Return Air Temp SP for Cooling
RAT_HIGH_ SAT	RA Temp SP for Hi Supply Air Temp **(VAV and Only if SAT Reset Method is Return Air)**	R/W	AV24	1049	Displays RA Temp SP Used for Switching to The High Supply Air Temp SP
RAT_LOW_SAT	RA Temp SP for Lo Supply Air Temp **(VAV and Only if SAT Reset Method is Return Air)**	R/W	AV25	1050	Displays RA Temp SP Used for Switching to The Low Supply Air Temp SP
RDY_RUN_C1A	Ready to Run Comp 1A Status	R	BI40	1321	Displays Status of Comp 1A Ready to Run if Comp is Off: (Yes/No)
RDY_RUN_ C1B	Ready to Run Comp 1B Status	R	BI41	1322	Displays Status of Comp 1B Ready to Run if Comp is Off: (Yes/No)
RDY_RUN_C2A	Ready to Run Comp 2A Status	R	BI42	1323	Displays Status of Comp 2A Ready to Run if Comp is Off: (Yes/No)
RDY_RUN_ C2B	Ready to Run Comp 2B Status	R	BI43	1324	Displays Status of Comp 2B Ready to Run if Comp is Off: (Yes/No)
RDY_RUN_C3A	Ready to Run Comp 3A Status **(70-150 Ton Only)**	R	BI44	1325	Displays Status of Comp 3A Ready to Run if Comp is Off: (Yes/No)
RDY_RUN_ C3B	Ready to Run Comp 3B Status **(70-150 Ton Only)**	R	BI45	1326	Displays Status of Comp 3B Ready to Run if Comp is Off: (Yes/No)

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
RDY_STOP_ C1A	Ready to Stop Comp 1A Status	R	BI46	1327	Displays Status of Comp 1A Ready to Stop if Operating: (Yes/No)
RDY_STOP_ C1B	Ready to Stop Comp 1B Status	R	BI47	1328	Displays Status of Comp 1B Ready to Stop if Operating: (Yes/No)
RDY_STOP_ C2A	Ready to Stop Comp 2A Status	R	BI48	1329	Displays Status of Comp 2A Ready to Stop if Operating: (Yes/No)
RDY_STOP_ C2B	Ready to Stop Comp 2B Status	R	BI49	1330	Displays Status of Comp 2B Ready to Stop if Operating: (Yes/No)
RDY_STOP_ C3A	Ready to Stop Comp 3A Status **(70-150 Ton Only)**	R	BI50	1331	Displays Status of Comp 3A Ready to Stop if Operating: (Yes/No)
RDY_STOP_ C3B	Ready to Stop Comp 3B Status **(70-150 Ton Only)**	R	BI51	1332	Displays Status of Comp 3B Ready to Stop if Operating: (Yes/No)
RET_AIR_ ENTH	Return Air Enthalpy	R	AI38	551	Displays Actual RA Enthalpy (Btu/lb)
RET_AIR_ HUMD	Return Air Humidity	R	AI39	552	Displays Actual RA Relative Humidity (%)
RET_AIR_ TEMP	Return Air Temp Current	R	AI40	553	Displays Actual RA Temp (°F)
RET_FAN_OUT	Exhaust/Return Fan VFD	R	AI41	554	Displays Output from Control to Exh or Ret Fan VFD (%)
RET_FAN_ PRES	Return Fan Pressure Current	R	AI42	555	Displays Actual Pressure that is Used to Control Return Fan Speed (iwg)
RET_FAN_ STAT	Return Fan Status	R	BI52	1333	Displays Status of Return Fan Run Verification Circuit (0=Stop/ Verification Ckt Open, 1=Run/ Verification Ckt Closed)
RST_ENT_BAS	Reset Enthalpy SP BAS	R/W	AV41	1066	Displays RA Enthalpy SP which Causes Unit to Switch from Evap Leaving High SP to Evap Leaving Low SP
SAT_HIGH_LIM	Suppy Air Temp Hi SP	R/W	AV26	1051	Displays Upper Limit for Supply Air Temp SP on a VAV Unit (°F)
SAT_LOW_LIM	Supply Air Temp Lo SP	R/W	AV27	1052	Displays Lower Limit for Supply Air Temp SP on a VAV Unit (°F)
SAT_RST_BAS	Supply Air Temp Reset BAS	R/W	AV28	1053	Displays Analog Input from BAS that Allows Reset of Active Supply Air Temp SP. 0 Uses SAT High SP and 5 Uses SAT Low SP. "SAT Rst BAS" Must Be Enabled in Service Menu for This Point to Function
SAT_SUC_ TMP1	Saturated Suct Temp Ckt 1	R	AI43	556	Displays Saturation Temp of System 1 Suction Gas Based on System 1 Suction Press (°F)
SAT_SUC_ TMP2	Saturated Suct Temp Ckt 2	R	AI44	557	Displays The Saturation Temp Of System 2 Suction Gas Based On System 2 Suction Press (°F)

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
SAT_SUC_ TMP3	Saturated Suct Temp Ckt 3 **(70-150 Ton Only)**	R	AI45	558	Displays Saturation Temp of System 3 Suction Gas Based on System 3 Suction Press (°F)
SAT_TEMPER	Supply Air Tempering Status	R	BI53	1334	Displays Status of Supply Air Tempering (On/Off)
SEN/MSC_FLT	Sensor/Misc Fault Status	R	BI54	1335	Displays Status of a Sensor or Misc Fault (0=No Fault 1=Faulted)
SF_PROV_SW	Supply Fan Status	R	BI55	1336	Displays Status of Supply Fan Air Proving Circuit (0=Stop Verification/ Ckt Open 1=Run Verification/Ckt Closed)
SF_SPD_H_ SAT	Fan Speed SP for Hi Supply Air Temp	R/W	AV29	1054	Displays Supply Fan Speed SP Used for Switching to High Supply Air Temp SP
SF_SPD_L_ SAT	Fan Speed SP for Lo Supply Air Temp	R/W	AV30	1055	Displays Supply Fan Speed SP Used for Switching to Low Supply Air Temp SP
SMOKE_ PUR_1	Smoke Purge 1 Status	R	BI56	1337	Displays Status of Smoke Purge 1 Input Either Hardwired or Communicated (On/Off)
SMOKE_ PUR_2	Smoke Purge 2 Status	R	BI57	1338	Displays Status of Smoke Purge 2 Input Either Hardwired or Communicated (On/Off)
SMOKE_ PUR_3	Smoke Purge 3 Status	R	BI58	1339	Displays Status of Smoke Purge 3 Input Either Hardwired or Communicated (On/Off)
SMOKE_ PUR1_B	Smoke Purge 1 Bas	R/W	AV90 BV14	1115	BAS Command that Allows Smoke Purge 1 To Be Activated (0=Off 1=On)
SMOKE_ PUR2_B	Smoke Purge 2 Bas	R/W	AV91 BV15	1116	BAS Command that Allows Smoke Purge 2 To Be Activated (0=Off 1=On)
SMOKE_ PUR3_B	Smoke Purge 3 Bas	R/W	AV92 BV16	1117	BAS Command that Allows Smoke Purge 3 To Be Activated (0=Off 1=On)
STG_1_COOL	1st Stage Cooling SP **(SZVAV Only)**	R/W	AV31	1056	Displays Active Supply Air Temp SP for A 1st Stage Cooling Input (Y1)
STG_1_HEAT	1st Stage Heating SP **(SZVAV Only)**	R/W	AV32	1057	Displays Active Supply Air Temp SP for a 1st Stage Heating Input (W1)
STG_2_COOL	2nd Stage Cooling SP **(SZVAV Only)**	R/W	AV33	1058	Displays Active Supply Air Temp SP for a 2nd Stage Cooling Input (Y2)
STG_2_HEAT	2nd Stage Heating SP **(SZVAV Only)**	R/W	AV34	1059	Displays Active Supply Air Temp SP for a 2nd Stage Heating Input (W2)
SUP_AIR_ TEMP	Supply Air Temp Current	R	AI46	559	Displays Actual Temp of Supply Air (°F)
SUP_AIR_ TRST	Supply Air Temp Reset	R	AI47	560	Displays Value, 0–5 VDC, of Hardwired or Communicated Input that will be Used to Reset Supply Air Temp SP (VDC)

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
SUP_FAN_VFD	Supply Fan VFD Speed	R	AI48	561	Displays Output from Control to Supply Fan VFD (%)
SUPPLY_FAN	Supply Fan Output Status	R	BI59	1340	Displays Status of Output from Controller to Supply Fan Circuit (0=Off 1=On)
SYSTEM_STOP	System Stop	R/W	AV35	1060	Allows BAS Command that Manually Shuts Down Compressor Circuits (0=All Ckts Can Operate 1=Shuts Down Ckt 1 2=Shuts Down Ckt 2 3=Shuts Down Ckt 3
SZ_MIN_VFD	Single Zone Minimum VFD	R/W	AV53	NA*	Allows Minimum Supply Fan Speed to be Reset Between 33% and 66% when Using SZVAV.
TEMP_1_SUCT	Suct Temp Ckt 1	R	AI49	562	Displays Actual System 1 Suct Line Temp (°F)
TEMP_1_ SUPER	Suct Superheat Ckt 1	R	AI50	563	Displays System 1 Superheat (°F)
TEMP_2_SUCT	Suct Temp Ckt 2	R	AI51	564	Displays Actual System 2 Suct Line Temp (°F)
TEMP_2_ SUPER	Suct Superheat Ckt 2	R	AI52	565	Displays System 2 Superheat (°F)
TEMP_3_SUCT	Suct Temp Ckt 3 **(70-150 Ton Only)**	R	AI53	566	Displays Actual System 3 Suct Line Temp (°F)
TEMP_3_ SUPER	Suct Superheat Ckt 3 **(70-150 Ton Only)**	R	AI54	567	Displays System 3 Superheat (°F)
UNIT_MODE	Current Oper Mode	R	AI58	571	0= OCC Cooling 1= OCC Cooling Low 2= OCC Cooling High 5= OCC Heating 6= OCC Heating Low 7= OCC Heating High 8= OCC Standby 9= UNOCC Cooling 10= UNOCC Cooling Low 11= UNOCC Cooling High 12= UNOCC Heating 13= UNOCC Heating Low 14= UNOCC Heating High 15= UNOCC Standby 16= Comfort Vent Cooling 17= Comfort Vent Heating 18= Night Set Back 19= Morning Warm Up 20= Power Up Standby

* Not Available

TABLE 41 - BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
UNIT_STOP	Unit Stop	R/W	AV93 BV17	1118	BAS Command that Allows Unit to be Shut Down (0=Normal Operation 1=Unit Stopped)
UNSTABLE_ SYS	Unstable System Status (Not Used)	R	BI60		
UNOCC_ZN_ COOL	Unocc Zone Cooling SP	R/W	AV38	1063	Unocc Zone Cooling SP
UNOCC_ZN_ HEAT	Unocc Zone Heating SP	R/W	AV39	1064	Unocc Zone Heating SP
VAV_HEAT	VAV Heat Relay Status	R	BI61	1342	Displays Status of Output that Energizes a VAV Heat Relay (Off/On)
VENT_ CONTROL	Ventilation Control	R/W	AV94 BV18	1119	BAS Command that Allows Selection of Ventilation Function (0=Fixed Minimum 1=Demand)
VENT_DEM_ OUT	Ventilation Demand	R	AI59	572	Displays Status of Ventilation Output for Demand Ventilation (%)
VENT_ENABLE	Ventilation System	R/W	AV95 BV19	1120	BAS Command that Allows Ventilation Function to be Turned On or Off (0=Off 1=On)
W1_LO_ HEAT_B	W1 Lo Heat BAS	R/W	AV96 BV20	1121	BAS Command that Allows an Input For W1, First Stage Heat (0=Off 1=On)
W1_LOW_ HEAT	W1 Low Heat Status	R	BI62	1343	Displays Status of W1 Heat Input Either Hardwired or Communicated From A Bas (On/Off)
W2_HI_ HEAT_B	W2 High Heat BAS	R/W	AV97 BV21	1122	BAS Command that Allows an Input for W2, Second Stage Heat (0=Off 1=On)
W2_HIGH_ HEAT	W2 High Heat Status	R	BI63	1344	Displays Status of W2 Heat Input Either Hardwired or Communicated From a BAS (On/Off)
Y1_LO_ COOL_B	Y1 Lo Cool BAS	R/W	AV98 BV22	1123	BAS Command that Allows an Input for Y1, First Stage Cool (0=Off 1=On)
Y1_LOW_ COOL	Y1 Low Cool Status	R	BI64	1345	Displays Status of Y1 Cool Input Either Hardwired or Communicated From BAS (On/Off)
Y2_HI_ COOL_B	Y2 High Cool BAS	R/W	AV99 BV23	1124	BAS Command that Allows an Input for Y2, Second Stage Cool (0=Off 1=On)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
Y2_HIGH_ COOL	Y2 High Cool Status	R	BI65	1346	Displays Status of Y2 Cool Input Either Hardwired or Communicated From BAS (On/Off)
ZONE_TEMP	Zone Temp Current	R	AI60	573	Displays Actual Zone Temperature (°F)
ZONE_TEMP_ BAS	Zone Temp Bas	R/W	AV40	1065	Allows BAS to Input a Zone Temperature Reading (°F); Control Method Must be Set to "Comm Zone Temp" for this Point to Function

NOTES

1. The most up-to-date listing of the Standard Points Mapping can be found in the YORK website.
2. For a Building Automation System using BACnet IP, a gateway must be used, since the Unit Controller does not have a functional IP Port. We recommend using a JCI NCE (MS-NCE2560-0).

SECTION 7–PARAMETER DESCRIPTIONS AND OPTIONS

TABLE 48 - DEFINITIONS

MENU ITEM	DEFINITION
ADAPT MORN WARM UP	This parameter is programmed through the PROGRAM key. Adaptive Morning Warm Up uses the past three days of warm up times and temperatures to calculate the start time for the current day. This parameter allows the user to USER ENABLED or USER DISABLED this feature.
BLDG PRESSURE CNTRL OFFSET	This parameter is programmed through the SETPOINTS key. The Unit Controller To determine when to turn on the exhaust fan. When the exhaust option is configured for ‘‘ON-OFF PRESS CNTRL.’’
BUILDING PRESSURE ACTIVE SETPOINT	This parameter is programmed through the SETPOINTS key. It identifies the control point for the building pressure.
BUILDING PRESSURE CURRENT	This is the actual pressure in the conditioned space.
CO2 LEVEL INSIDE	This is the CO_2 level of the air in the conditioned space.
CO2 LEVEL OUTSIDE	This is the CO_2 level of the outdoor air.
CO2 OFFSET SETPOINT	This parameter is programmed through the SETPOINTS key. The Outside CO_2 level must be lower than the Indoor CO_2 level plus the CO_2 OFFSET SETPOINT before the outdoor door damper will start to open for additional ventilation.
CO2 OFFSET CURRENT	This represents the current difference between the “CO_2 LEVEL INSIDE” versus the “CO_2 LEVEL OUTSIDE.”
COMFORT VENTILATION	This parameter is programmed through the PROGRAM key. This function is only used on a SZVAV unit. The Unit Controller monitors the Return Air Temperature and energizes stages of cooling or heating prior to a demand from the space. This function is only active when the unit is in the Occupied mode. The choices are USER ENABLED or USER DISABLED.
COMP SYS 1 STATUS	This is the current operating mode of the system 1 compressors. The display will show Normal - Comp A On, Normal - Comp B On, Normal - Both ON, Normal - Both Off, Safety Trip, Safety Fault, Safety Lockout, Low Amb Inhibit, Low Suct Temp Unl, High DP Unload, or User Disabled.
COMP SYS 2 STATUS	This is the current operating mode of the system 2 compressors. The display will show Normal - Comp A On, Normal - Comp B On, Normal - Both ON, Normal - Both Off, Safety Trip, Safety Fault, Safety Lockout, Low Amb Inhibit, Low Suct Temp Unl, High DP Unload, or User Disabled.
COMP SYS 3 STATUS	This is the current operating mode of the system 3 compressors. The display will show Normal - Comp A On, Normal - Comp B On, Normal - Both ON, Normal - Both Off, Safety Trip, Safety Fault, Safety Lockout, Low Amb Inhibit, Low Suct Temp Unl, High DP Unload, or User Disabled.
CONDENSER FAN 1A/1	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 1A /1.
CONDENSER FAN 1B/2	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 1B /2.
CONDENSER FAN 2A/3	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 2A /3.
CONDENSER FAN 2B/4	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 2B/4.
CONDENSER FAN 3A/5	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 3A /5.
CONDENSER FAN 3B/6	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 3B/6.
CONTINUOUS VENT	This parameter is programmed through the PROGRAM key. This is only used on a SZVAV unit. When this parameter is enabled the supply blower will operate whenever the unit is in the OCC mode. The choices are USER ENABLED or USER DISABLED.
CONTROL METHOD	This parameter is programmed through the OPTIONS key and identifies the control method being used on a SZVAV unit. The choices are Wired Zone Temp or Comm Zone Temp.
COOLING CONTROL OFFSET	This is the control band the unit is trying to maintain. The control band is the Active setpoint +/- the Cooling Control Offset. If the temperature is above this band additional cooling is required, if the temperature is below this band cooling is decreased.
CURRENT OPER MODE	This is the current operating mode of the unit. The display will show OCC Standby, OCC Cooling Low, OCC Cooling High, OCC Heating Low, OCC Heating High, UNOCC Standby, UNOCC Cooling Low, UNOCC Cooling High, UNOCC Heating Low, UNOCC Heating High, Morning Warm-up, Comfort Vent Cooling, Comfort Vent Heating, Occupied Cooling, Occupied Heating, Unoccupied Cooling, or Unoccupied Heating.

TABLE 42–DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
CURRENT RUN TIME COMP A	This is the amount of time the compressor has been in operation during the current cycle. This is shown for each compressor of every compressor system.
CURRENT RUN TIME COMP B	This is the amount of time the compressor has been in operation during the current cycle. This is shown for each compressor of every compressor system.
DAILY WARM UP TIME	This is the time it takes to bring the Return Air Temperature up to setpoint during Adaptive Morning Warm Up. The Unit Controller uses this value in the calculation of Daily Warm Up Time Day 1.
DAILY WARM UP TIME DAY 1	This is the Morning Warm Up time the Unit Controller recorded during the previous day 1. This value is used to calculate the current Morning Warm initiate time for Adaptive Morning Warm Up.
DAILY WARM UP TIME DAY 2	This is the Morning Warm Up time the Unit Controller recorded during the previous day 2. This value is used to calculate the current Morning Warm initiate time for Adaptive Morning Warm Up.
DAILY WARM UP TIME DAY 3	This is the Morning Warm Up time the Unit Controller recorded during the previous day 3. This value is used to calculate the current Morning Warm initiate time for Adaptive Morning Warm Up.
DAMPER HARDWARE	This parameter is programmed through the OPTIONS key and identifies the type of ventilation system installed in the unit. The choices are None, 2 Position Damper, Standard Dampers, or TEK-Air Full IAQ.
DISPLAY LANGUAGE	This parameter is programmed through the OPTIONS key. This allows the user to select the language the Unit Controller will use to display the information at the User Interface. The choices are English or Spanish.
DISPLAY UNITS	This parameter is programmed through the OPTIONS key. This allows the user to select which unit of measure the Unit Controller will use to display the information at the User Interface. The choices are Imperial, metric.
DUCT PRESS TRANSDUCER SPAN	This parameter is programmed through the SETPOINTS key. This allows the use of three different duct pressure control ranges, 0 to1.00 INWG, 0 to 2.50 INWG, or 0 to 5.00 INWG.
DUCT STATIC OVER PRESSURE	This parameter is programmed through the SETPOINTS key. This sets the maximum allowable Duct Static value before the Unit Controller lockouts the unit on an over pressure fault.
DUCT STATIC PRESS ACTIVE SP	This is the current Duct Static setpoint that the Unit Controller is trying to maintain.
DUCT STATIC PRESS CURRENT	This is the actual duct static pressure value.
DUCT STATIC RESET LOW SETP	This parameter is programmed through the SETPOINTS key. This is the minimum Duct Static Control point.
DUCT STATIC RESET HIGH SETP	This parameter is programmed through the SETPOINTS key. This is the maximum Duct Static Control point.
ECONOMIZER CONTROL OUTPUT	This is the analog output from the Unit Controller to the Economizer Damper Actuator.
ECONO INSTALLED	This parameter is programmed through the PROGRAM key and tells the Unit Controller what type of economizer is installed, None, Dry Bulb, Single Enthalpy, Dual Enthalpy.
ECONO METHOD ACTIVE	This value indicates which of the available economizer methods the Unit Controller is using.
ECONO METHOD TO USE	This parameter is programmed through the PROGRAM key and tells the Unit Controller which of the available economizer options to use. The choices are Dry Bulb, Single Enthalpy, Dual Enthalpy, or Best Available.
ECONO OUTPUT FOR FAN START	This parameter is set through the SETPOINTS key and identifies the position of the economizer damper required to turn ON the exhaust fan in an ON/OFF DAMPER CTRL.
ECONO OUTPUT FOR FAN STOP	This parameter is set through the SETPOINTS key and identifies the position of the economizer damper required to turn OFF the exhaust fan in an ON/OFF DAMPER CTRL option.
ECONO SYS STATUS	This is the active status of the economizer system, display will show Normal- Active, Normal-Inactive, Faulted, User Disabled; or None.

TABLE 42–DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
ELEC HEAT CAPACITY	This parameter is programmed through the OPTIONS key. This parameter is used to identify the electric heat capacity installed in the unit. The options are 40 KW, 80 KW, 40 KW-200, 80 KW-200, 100 KW, 100 KW-200, 108 KW, 120 KW, 150 KW, 160 KW, 200 KW, 240 KW, or 250 KW.
EXHAUST DAMPER POSITION/VFD	This identifies the percentage output from the Unit Controller to the Exhaust Damper or Exhaust Fan when controlled by the unit or BAS (when exhaust Control BAS is enabled).
EXHAUST FAN OUTPUT	This identifies the Unit Controller is sending a Binary output to energize the exhaust fan circuit.
EXHAUST FAN STATUS	This verifies a Binary input to the Unit Controller is present when the exhaust fan is operating.
EXHAUST OUTPUT FOR FAN START	This parameter is set through the SETPOINTS key and identifies the position of the exhaust damper required to turn ON the exhaust fan in an ON/OFF PRESS CNTRL option.
EXHAUST OUTPUT FOR FAN STOP	This parameter is set through the SETPOINTS key and identifies the position of the exhaust damper required to turn OFF the exhaust fan in an ON/OFF PRESS CNTRL option.
EXHAUST/RETURN FAN VFD	This is a derived value that indicates the output, in percent, to the Return Fan VFD.
EXHAUST SYS STATUS	This is the active status of the exhaust system. The display will show Normal-Active, Normal-Inactive, Faulted, User Disabled, or None.
EXHAUST/RETURN FAN VFD	This identifies speed output in percentage that is being sent to the exhaust or return fan VFD.
FAN SPEED SETP FOR HIGH SAT	This parameter is programmed through the SETPOINTS key. When the supply fan speed is equal to or less than this value the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT setpoint High Limit.
FAN SPEED SETP FOR LOW SAT	This parameter is programmed through the SETPOINTS key. When the supply fan speed is equal to or greater than this value the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT setpoint Low Limit.
FILTER STATUS	This is status of the unit filters. A differential pressure switch must be installed to measure the pressure drop across the filters. When the filters are dirty the switch closes sending a Binary signal to the Unit Controller. The User Interface display will show Okay or Change.
FURNACE 1 MODE	This is the current status of the first heat exchanger section of a staged gas heat unit. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 1A MODE	This is the current status of the modulating section of the modulating gas heat furnace. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 1B MODE	This is the current status of the non-modulating section of the modulating gas heat furnace. The User Interface will display Off, Purge, Ignition, On, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 2 MODE	This is the current status of the second heat exchanger section of a staged gas heat unit. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 3 MODE	This is the current status of the third heat exchanger section of a staged gas heat unit. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
GAS HEAT CAPACITY	This parameter is programmed through the OPTIONS key. This parameter is used to identify the gas heat capacity installed in the unit. The options are 375 MBH, 750 MBH, or 1125 MBH.
HEAT ENTERING TEMP	This is the temperature of the supply air entering the staged heat section. This value is used to initiate and terminate Supply Air Tempering when Staged Heat is installed.
HEAT LIMIT TEMPERATURE	This parameter is programmed through the SETPOINTS key. This value determines the maximum allowable Supply Air Temperature when heating is installed. If the temperature goes above this setting the heat section will be shut down.
HEATING CONTROL OFFSET	This is the control band the unit is trying to maintain. The control band is the Active setpoint +/- the Heating Control Offset. If the temperature is below this band, additional heating is required, if the temperature is above this band heating is decreased.

TABLE 42–DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
HEATING SAT	This parameter is programmed through the SETPOINTS key. On a VAV unit, this becomes the Active Supply Air Temperature setpoint for heating operation. The Unit Controller controls the heating option to try and maintain this temperature.
HEATING SYS STATUS	This is the current operating mode of the Heating Section. The display will show Normal - Active, Normal - Inactive, Safety Trip, Safety Fault, Safety Lockout, User Disabled, or None.
HEATING SYSTEM TYPE	This parameter is programmed through the OPTIONS key. This parameter is used to identify the type of heat installed in the unit. The options are None, Electric, Stage Gas, Modulating Gas, Hot Water / Steam.
HW / STEAM FRZ STAT	This is the status of the hydronic heat freezestat. This is done through a Binary input to the Unit Controller. The switch is open for normal operation and closed on failure. The User Interface will indicate OK or FAULTED.
HW / STEAM HEAT - VALVE POS	This is the output from the Unit Controller to the hydronic valve as percent open.
HW VALVE ACTION	This parameter is programmed through the PROGRAM key. This parameter controls the output to the hydronic modulating valve. When the parameter is set to DIRECT the output is 0 volts for off and 10 volts for full capacity. When the parameter is set to REVERSE the output is 10 volts for off and 0 volts for full capacity.
IAQ DMPR AIR FLOWS OA FLOW 1	This is the airflow through TEK-Air Full IAQ.
MECH CLG LOCKOUT TEMP	This parameter is programmed through the SETPOINTS key. When the outdoor temperature is equal to or less than this temperature, the Unit Controller will prevent the compressors from operating.
MINIMUM OA FLOW SETPOINT	This parameter is programmed through the SETPOINTS key. When air measurement stations are installed and the unit is not in the Occupied mode, this is the minimum allowable airflow.
FURNACE 1A MODE APRX RATE	This is the approximate firing rate of the modulating gas heat section in MBH.
FURNACE 1A MODE RELATIVE	This is the output from the Unit Controller to the modulating gas heat section in percent of full capacity.
MORNING WARM UP	This parameter is programmed through the PROGRAM key. This tells the Unit Controller if the Morning Warmup option is available or not. When it is programmed to USER ENABLED, Morning Warm Up is available to be used. When it is programmed to USER DISABLED, Morning Warm Up is unavailable.
MORNING WARM UP MAX TIME	This parameter is programmed through the SETPOINTS key. This value is the maximum time the Unit Controller will allow for Morning Warm Up when the unit is in the Adaptive Morning Warm Up mode. If the derived Morning Warm Up Opt Time exceed this time the Morning Warm Up Max Time will be used.
MORNING WARM UP OPT TIME	This is the average of the previous three days Warm Up times plus 10 minutes. This value will be used to determine the Morning Warm Up start time for the next day when the unit is in the Adaptive Morning Warm Up mode.
NIGHT SET BACK	This parameter is programmed through the PROGRAM key. This parameter allows the user to enable or disable Night Set Back. If this parameter is disabled Unoccupied Heating will not be available. The two parameters to choose from are USER ENABLED or USER DISABLED.
OA DAMPER MAXIMUM POSITION	This parameter is programmed through the SETPOINTS key. This establishes the maximum amount of ventilation air to be used in a Demand Ventilation situation.
OA DAMPER MINIMUM POSITION	This parameter is programmed through the SETPOINTS key. This establishes the minimum amount of ventilation air to be used when the unit is in the OCC mode.
OA DAMPER POSITION ACTIVE SP	This is the damper position setpoint, in percent open, the Unit Controller is trying to maintain.
OA DAMPER POSITION CURRENT	This is the actual output, in percent open to the outdoor air damper.
OUTSIDE AIR ENTHALPY	This indicates the total heat content of the outdoor air.
OUTSIDE AIR HUMIDITY	This is the outdoor air relative humidity.
OUTSIDE AIR TEMP	This is the outdoor air dry bulb temperature.

TABLE 42–DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
OAT SETPOINT FOR HIGH SAT	This parameter is programmed through the SETPOINTS key. When the outdoor temperature is equal to or less than this temperature the Active Supply Air Temperature setpoint on a VAV Unit will be set to the SAT HIGH SETPOINT.
OAT SETPOINT FOR LOW SAT	This parameter is programmed through the SETPOINTS key. When the outdoor temperature is equal to or greater than this temperature the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT LOW SETPOINT.
OUTSIDE AIR ENTHALPY SETPOINT	This parameter is programmed through the SETPOINTS key and is the upper limit of outdoor enthalpy that can be used for economizer operation. If the outdoor air enthalpy is above this value, the economizer is made inactive.
OUTSIDE AIR FLOW ACTIVE SP	This is the airflow setpoint that the Unit Controller is trying to maintain.
OUTSIDE AIR FLOW TOTAL	This is the same as OA Flow 1 for TEK-Air Full IAQ.
OUTSIDE AIR MAXIMUM FLOW	This parameter is programmed through the SETPOINTS key. When air measurement stations are installed and the unit is in the Demand Ventilation mode, this is the maximum allowable airflow value.
OUTSIDE AIR MINIMUM FLOW	This parameter is programmed through the SETPOINTS key. When air measurement stations are installed and the unit is in the Demand Ventilation mode, this is the minimum airflow value.
POWER EXHAUST TYPE	This parameter is programmed through the OPTIONS key and tells the Unit Controller what type of Exhaust is installed. The choices are None, On-Off Damper Cntrl, On-Off Press Cntrl, Modulate Damper VFD, Return Fan w/Exh, or Return Fan w/o Exh.
PRESS TRANS PKG	This parameter is programmed through the OPTIONS key. This identifies to the Unit Controller which of the compressor systems are configured with suction and discharge pressure transducers. The options are None, Sys 1; Sys 1, 2; or Sys 1, 2 and 3.
PRESSURE DISCHARGE*	This is the discharge pressure and is shown for each compressor system if pressure transducers are installed and configured for the system.
PRESSURE SUCTION*	This is the suction pressure and is shown for each compressor system if pressure transducers are installed and configured for the system.
PUMPDOWN	This parameter is programmed through the PROGRAM key. If Pumpdown is USER ENABLED at the end of the compressor system cycle the solenoid value to the expansion vales will close and the compressor will continue to operate for 30 seconds or until the low pressure cutout opens. This removes the refrigerant from the low side of the system. The choices are USER ENABLED or USER DISABLED. If Pumpdown is ENABLED all compressor system will use Pumpdown.
RETURN AIR ENTHALPY	This is the total heat content of the return air.
RETURN AIR HUMIDITY	This is the return air relative humidity.
RETURN AIR TEMP	This is the return air dry bulb temperature.
RETURN AIR TEMP CURRENT	This is the temperature of the return air entering the unit.
RAT HEATING SETPOINT	On a VAV unit, the Unit Controller monitors the RAT HEATING SETPOINT. When the return air temperature is 0.5°F below this value the control switches into the Occupied Heating mode.
RAT COOLING SETPOINT	On a VAV unit, the Unit Controller monitors the RAT COOLING SETPOINT. When the return air temperature is 0.5°F above this value the control switches into the Occupied Cooling mode.
RAT SETPOINT FOR HIGH SAT	This parameter is programmed through the SETPOINTS key. When the Return Air Temperature is equal to or LESS than this temperature the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT HIGH SETPOINT.
RAT SETPOINT FOR LOW SAT	This parameter is programmed through the SETPOINTS key. When the Return Air Temperature is equal to or greater than this temperature the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT LOW SETPOINT.
READY TO RUN COMP A	This means the minimum OFF time has been achieved and all the safety circuits are closed and compressor A of the system is ready to be energized. The User Interface will display either YES or NO.

* May be 1, 2, or 3

TABLE 42–DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
READY TO RUN COMP B	This means the minimum OFF time has been achieved and all the safety circuits are closed and compressor B of the system is ready to be energized. The User Interface will display either YES or NO.
READY TO STOP COMP A	This means the minimum ON time has been achieved and compressor A of the system is ready to be de-energized. The User Interface will display either YES or NO.
READY TO STOP COMP B	This means the minimum ON time has been achieved and compressor B of the system is ready to be de-energized. The User Interface will display either YES or NO.
REFRIGERANT TYPE	This parameter is programmed through the OPTIONS key and identifies the type of refrigerant in the unit. The choice is R-410A.
RETURN FAN PRESSURE ACTIVE SP	This is the current mixed air chamber pressure that the Unit Controller is trying to maintain.
RETURN FAN PRESS CURRENT	This is the actual pressure in the mixed air chamber of the unit.
RETURN FAN OUTPUT	This is the Binary output from the Unit Controller to the Return Fan control system.
RETURN FAN STATUS	This is a Binary input into the Unit Controller that identifies the Return Fan is functioning.
SAFETY INPUT LPCO	This is the Binary input to the Unit Controller from the Low Pressure Cutout safety circuit. ON means the safety circuit is normal and FAULTED means it has faulted. This parameter will be shown for each compressor system.
SAFETY INPUT CHAIN	This is the Binary input to the Unit Controller from the Compressor Safety Circuit Chain. This includes the high pressure cutout, compressor motor protector, and the external overload or circuit breaker. ON means the safety circuit is normal and FAULTED means it has faulted. This parameter will be shown for each compressor system.
SAT RESET METHOD	This parameter is programmed through the OPTIONS key and identifies the Supply Air Temperature reset method being used on a VAV Unit. The choices are Hardwired, Outside Air, Return Air, or Supply Fan Speed.
SAT HIGH SETPOINT	This parameter is programmed through the SETPOINTS key. This establishes the maximum Active Supply Air Temperature to be used in a VAV Unit.
SAT LOW SETPOINT	This parameter is programmed through the SETPOINTS key. This establishes the minimum Active Supply Air Temperature to be used in a VAV Unit.
SENSOR / MISC STATUS	This is the current status of the Sensors. The display will show Normal, Warning, Safety Trip, Safety Fault, or Safety Lockout.
SINGLE ZONE MINIMUM VAV SPEED	This parameter provides the minimum speed of the Supple Fan during SZVAV operation.
SMOKE PURGE SEQ 1	This parameter is programmed through the OPTIONS key. This allows the user to select which of the three smoke purge sequences to use a sequence 1, Purge, Pressurization, or Evacuation. Smoke Purge Sequence 1 is energized through a Binary input to the Unit Controller.
SMOKE PURGE SEQ 2	This parameter is programmed through the OPTIONS key. This allows the user to select which of the three smoke purge sequences to use a sequence 2, Purge, Pressurization, or Evacuation. Smoke Purge Sequence 2 is energized through a Binary input to the Unit Controller.
SMOKE PURGE SEQ 3	This parameter is programmed through the OPTIONS key. This allows the user to select which of the three smoke purge sequences to use a sequence 3, Purge, Pressurization, or Evacuation. Smoke Purge Sequence 3 is energized through a Binary input to the Unit Controller.
1ST STAGE COOLING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a SZVAV unit as the Active SAT Setpoint for 1st Stage cooling operation.
1ST STAGE HEATING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a SZVAV unit as the Active SAT Setpoint for 1st Stage heating operation.
2ND STAGE 2 COOLING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a SZVAV unit as the Active SAT Setpoint for 2nd Stage cooling operation.
2ND STAGE 2 HEATING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a SZVAV unit as the Active SAT Setpoint for 2nd Stage heating operation.
STAGED HEAT STATUS STGS ON	This identifies the number of stages of gas or electric heat that the Unit Controller has energized.

TABLE 42–DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
STAGED HEAT STATUS STGS AVAIL	This identifies the number of stages of gas or electric heat that are available.
SUCTION TEMP	This is the temperature of the suction line leaving the evaporator coil and will be shown for each system. This value is monitored and used to prevent liquid refrigerant from being returned to the compressor.
SUP AIR TEMPERING	This parameter is programmed through the PROGRAM key. This parameter is used to allow the heat to operate when the unit is in the Occupied Standby Mode to temper the ventilation air entering the space. The choices are USER ENABLED or USER DISABLED.
SUPPLY AIR TEMP ACTIVE SP	This is the Supply Air Temperature the Unit Controller is trying to maintain.
SUPPLY AIR TEMP CURRENT	This is the current Supply Air Temperature supplied by the unit.
SUPPLY FAN OUTPUT	This is the Binary output from the Unit Controller to the Supply Fan control system.
SUPPLY FAN OUTPUT PROOF	This is a Binary input into the Unit Controller that identifies the Supply Fan is functioning.
SUPPLY FAN VFD SPEED	This indicates the output, in percent, to the SUPPLY FAN VFD.
SUPPLY SYS STATUS	This is the active status of the Supply System, display will show Normal- Active; Normal-Inactive; Safety Trip, Safety Fault, or Safety Lockout.
SYSTEM UNLOADING PRESSURE	This parameter is programmed through the SETPOINTS key. If two compressors of the system are operative and the discharge pressure is equal to or greater than this value the Unit Controller will turn off one of the compressors. This feature is only operative when a discharge pressure transducer is installed in the compressor system.
TEMPERATURE SUPERHEAT	This is calculated for each compressor system that has a suction line pressure transducer installed and configured. This is the refrigerant evaporator superheat leaving the evaporator coil.
UNIT INSTALLED ALTITUDE	This parameter is programmed through the SETPOINTS key. This is the altitude at which the unit is installed. This is used in the calculation of an airflow correction factory when air measuring stations are installed.
UNIT SIZE	This parameter is programmed through the OPTIONS key and identifies the size of the unit. The choices are 120 Ton or 130 Ton.
UNIT TYPE	This parameter is programmed through the OPTIONS key and identifies the type of unit. The choices are SZVAV or Variable Air Volume.
UNIT-OVERALL STATUS	This is the active status of the Unit. The display will show Local Stop, Run, Unit Trip, Unit Fault, Unit Lockout, SMK Purge # - Press, SMK Purge #-Purge, or Smk Purge #-Evac.
VENT SYS STATUS	This is the active status of the Ventilation System. The display will show Normal- Active, Normal-Inactive, Safety Trip, Safety Fault, Safety Lockout, User Disabled, or None.
VENTILATION CONTROL	This parameter is programmed through the OPTIONS key and identifies whether the unit will operate with a Fixed Minimum or Demand ventilation system.
VENTILATION DEMAND	This is the output in percent to the outside air damper when the unit is operating in the Demand Ventilation Mode.
ZONE TEMP OCC ZONE COOLING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Occupied Cooling Mode.
ZONE TEMP OCC ZONE HEATING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Occupied Heating Mode.
ZONE TEMP UNOCC ZONE COOLING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Unoccupied Cooling Mode.
ZONE TEMP UNOCC ZONE HEATING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Unoccupied Heating Mode.
ZONE TEMP CURRENT	This is the temperature in the conditioned space.

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SECTION 8–SERVICE

ANALOG INPUT OPERATION

This section describes the control operation of the 29 analog inputs. These inputs are used by the control to monitor and respond to unit temperatures, pressures, enthalpy, etc. The location of each of these connections on the Unit Controller is contained in *Table 40 on page 123*. Notice that the ID gives the jack connection designated as "J" and then the identifying number of the connector, followed by a – and then the pin number of the connector. For example, the SUPPLY AIR TEMPERATURE analog input would be found at J1-1. This is connector J1–Pin 1. As the Unit Control board is positioned in the control box, the top row of the J series connectors is the input, the middle row is the common, and the bottom row is the 5VDC input to the sensor. Also, the pin in the right-hand top corner is pin 1.

Temperature Sensors

The temperature sensors are all 10K Type III Thermistors. The relationship between the temperature and the voltage output and resistance is contained in *Table 43 on page 157*. The following analog inputs are of this type: Supply Air Temperature, Heat Entering Temp, Flex Evap Temp, Outside Air Temp, Return Air Temp, Suction Temp #1, Suction Temp #2, Suction Temp #3, and Zone Temp.

Duct Pressure Transducer

The Duct Pressure Transducer is located in the return air section of the unit. The purpose of the transducer is to sense and convert the static pressure in the supply-side of the duct to a 0 to 5VDC signal. The DC voltage is sent to the Unit Controller and compared against the "DUCT STATIC PRESS ACTIVE SP." The transducer is factory wired, but pneumatic tubing must be field supplied and installed (refer to *SECTION 2–INSTALLATION*). The duct static pressure transducer measures differential pressure between the pressure in the duct and atmospheric pressure. When verifying transducer operation, the technician must insert a tee in the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the duct pressure vs. output VDC from the transducer. *Table 44 on page 158* shows the relationship between the pressure applied to the duct pressure transducer and the output voltage. The output is linear between 0.0 iwg and the SPAN. The "DUCT PRESS TRANSDUCER SPAN" can be set to 1.25, 2.5 or 5 iwg

TABLE 49 - TEMPERATURE SENSOR RESISTANCE

°F	VOLTAGE	RESISTANCE	°C
-25	0.49	139,639	-30.6
-20	0.53	127,453	-28.9
-15	0.60	109,624	-26.1
-10	0.69	94,519	-23.34
-5	0.78	81,665	-20.55
0.0	0.88	70,750	-17.78
5	0.98	61,418	-15.00
10	1.10	53,426	-12.22
15	1.22	46,582	-9.44
20	1.35	40,703	-6.67
25	1.48	35,639	-3.89
30	1.62	31,269	-1.11
35	1.77	27,490	1.67
40	1.91	24,219	4.44
45	2.06	21,377	7.22
50	2.21	18,900	10.00
55	2.36	16,744	12.78
60	2.51	14,681	15.56
65	2.66	13,216	18.33
70	2.80	11,771	21.11
75	2.94	10,502	23.89
80	3.08	9,388	26.67
85	3.21	8,404	29.45
90	3.33	7,537	32.22
95	3.45	6,770	35.0
100	3.56	6,090	37.78
105	3.66	5,487	40.56
110	3.76	4,951	43.34
115	3.85	4,475	46.11
120	3.94	4,050	48.89
125	4.02	3,671	51.66
130	4.09	3,332	54.44
135	4.16	3,029	57.22

TABLE 50 - BUILDING PRESSURE TRANSDUCER OUTPUT

DIFFERENTIAL INPUT PRESSURE - IWG	OUTPUT VOLTAGE - VDC
-0.50	0.00
-0.40	0.50
-0.30	1.00
-0.20	1.50
-0.10	2.00
0.00	2.50
0.10	3.00
0.20	3.50
0.30	4.00
0.40	4.50
0.50	5.00

Building Pressure Transducer

The Building Pressure Transducer is located in the return air section of the unit. The purpose of the transducer is to sense and convert the static pressure in the building to a 0 to 5VDC signal. The DC voltage is then sent to the Unit Controller and compared against the "BUILDING PRESSURE ACTIVE SETPOINT." The transducer is factory wired, but pneumatic tubing must be field supplied and installed (refer to *SECTION 2–INSTALLATION*). The Building Pressure Transducer measures differential pressure in the building and atmospheric pressure. When verifying transducer operation, the technician can insert a tee into the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the building pressure vs. output VDC from the transducer. A practical and quick check of this transducer can also be accomplished by removing the pneumatic tubing lines from both the low and high side connections on the transducer. Since both of the inputs will now be exposed to the same pressure, the differential pressure will be zero, and the output 2.5 VDC according to *Table 44 on page 158*.

TABLE 51 - DUCT PRESSURE TRANSDUCER

1.25 IWG SPAN DIFFERENTIAL INPUT PRESS	2.5 IWG SPAN DIFFERENTIAL INPUT PRESS	5.0 IWG SPAN DIFFERENTIAL INPUT PRESS	VOLTAGE VDC
0.125	0.25	0.5	0.50
0.25	0.50	1.0	1.00
0.375	0.75	1.50	1.50
0.50	1.00	2.00	2.00
0.625	1.25	2.50	2.50
0.75	1.50	3.00	3.00
0.875	1.75	3.50	3.50
1.00	2.00	4.00	4.00
1.125	2.25	4.50	4.50
1.25	2.50	5.00	5.00

Return Fan Pressure Transducer

If the unit is order with the Return Fan Option the unit will have a Return Fan Pressure Transducer. The transducer is mounted in the return compartment and compares the pressure in the return air compartment to atmospheric pressure. The Unit Controller varies the speed of the Return Fan in order to maintain the correct differential pressure in the return compartment. When verifying transducer operation, the technician can insert a tee into the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the return compartment pressure vs. output VDC from the transducer. A practical and quick check of this transducer can also be accomplished by removing the pneumatic tubing lines from both the low and high side connections on the transducer. Since both of the inputs will now be exposed to the same pressure, the differential pressure will be zero, and the output 2.5 VDC according to *Table 46 on page 159.*

TABLE 52 - RETURN FAN PRESSURE TRANSDUCER OUTPUT

DIFFERENTIAL INPUT PRESSURE - IWG	OUPTUT VOLTAGE - VDC
-1.00	0.00
-0.80	0.50
-0.60	1.00
-0.40	1.50
-0.20	2.00
0.00	2.50
0.20	3.00
0.40	3.50
0.60	4.00
0.80	4.50
1.00	5.00

Discharge Pressure Transducer

The discharge Pressure Transducer is located in the common discharge line of the tandem compressors for each refrigerant circuit. The purpose of this transducer is to sense and convert the discharge pressure into a DC voltage. The DC voltage is then sent to the Unit Controller where it is used to control the number of condenser fan when the unit is in cooling operation. The discharge pressure value, in PSIG, is displayed by the User Interface.

The Discharge Transducer has a range of 0–650 PSIG, with a linear output of 0–5 DC volts. *Table 47 on page 159* illustrates the DC volt output from the transducer for a given discharge pressure.

Suction Pressure Transducer

The optional suction pressure transducer is located in the common suction line of the tandem compressors for each refrigerant circuit. The purpose of the transducer is to sense and convert the suction pressure to a DC voltage. The DC voltage is then sent to the Unit Controller where it is displayed by the User Interface. When this option is installed the Unit Controller will also calculate and display the Evaporator Superheat value for the system.

The Suction Transducer has a range of 0 to 0–400 PSIG, with a linear output of 0–5 VDC. *Table 47 on page 159* illustrates the DC volt output from the transducer for a given suction pressure.

TABLE 53 - PRESSURE TRANSDUCERS

SUCTION TRANSDUCER		DISCHARGE TRANSDUCER	
PRESSURE PSIG R-410A	VOLTAGE VDC	PRESSURE PSIG R-410A	VOLTAGE VDC
0	0.50	0	0.50
50	1.00	81	1.00
100	1.50	162	1.50
150	2.00	244	2.00
200	2.50	325	2.50
250	3.00	406	3.00
300	3.50	488	3.50
350	4.00	569	4.00
400	4.50	650	4.50

Humidity Sensors

The humidity sensor outputs a 0–5 VDC in response to the relative humidity sensed. An outdoor air humidity sensor is used whenever the economizer is configured for single or dual enthalpy. A return air humidity sensor is used whenever the economizer is configured for dual enthalpy. *Table 48 on page 160* gives the relationship between the voltage output of the humidity sensor and the % relative humidity.

TABLE 54 - HUMIDITY SENSOR OUTPUTS

% RELATIVE HUMIDITY	OUTPUT VOLTAGE VDC	% RELATIVE HUMIDITY	OUTPUT VOLTAGE VDC
5	0.25	55	2.75
10	0.50	60	3.00
15	0.75	65	3.25
20	1.00	70	3.50
25	1.25	75	3.75
30	1.50	80	4.00
35	1.75	85	4.25
40	2.00	90	4.50
45	2.25	95	4.75
50	2.50	100	5.00

CO_2 Sensor

Two CO_2 sensors are used in conjunction with the "DEMAND VENTILATION" option. In "DEMAND VENTILATION" the Unit Control monitors the CO_2 level of the outdoor air and the CO_2 level in the conditioned space and varies the amount of ventilation air based on the relationship between these two values. *Table 49 on page 160* gives the VDC output for a given CO_2 level.

TABLE 55 - CO_2 SENSOR OUTPUT

PPM CO2	OUTPUT VOLTAGE VDC	PPM CO2	OUTPUT VOLTAGE VDC
80	0.20	1120	2.80
160	0.40	1200	3.00
240	0.60	1280	3.20
320	0.80	1360	3.40
400	1.00	1440	3.60
480	1.20	1520	3.80
560	1.40	1600	4.00
640	1.60	1680	4.20
720	1.80	1760	4.40
800	2.00	1840	4.60
880	2.20	1920	4.80
960	2.40	2000	5.00
1040	2.60		

Furnace Status Input

The Unit Controller monitors the operation of the Staged and Modulating Gas Heat sections and displays the status through the STATUS screen of the User Interface. The operation of each of the gas heat sections is monitored by a multiplexer installed in the gas heat section. When a gas heat section is energized, it sends a 24 volt signal to the multiplexer. The multiplexer takes the five ON/OFF inputs and converts them into a 0 to 5VDC signal that is sent to the Unit Controller. The Unit Controller then decodes this analog input and displays the furnace section status. *Tables 55 and 56 on page 161* show the relationship between the DC voltage and the furnace operation status.

TABLE 56 - FURNACE STATUS INPUT MODULATING GAS HEAT

MIN VOLTS DC	MAX VOLTS DC	MODULATING FURNACE 1A STATUS	FURNACE 1A HIGH STATUS	FURNACE 2 STATUS	FURNACE 3 STATUS	FURNACE 1B STATUS
0.086	0.166	OFF	OFF	OFF	OFF	OFF
0.224	0.313	ON	OFF	OFF	OFF	OFF
0.361	0.461	OFF	ON	OFF	OFF	OFF
0.499	0.609	ON	ON	OFF	OFF	OFF
0.637	0.756	OFF	OFF	ON	OFF	OFF
0.774	0.904	ON	OFF	ON	OFF	OFF
0.912	1.051	OFF	ON	ON	OFF	OFF
1.050	1.199	ON	ON	ON	OFF	OFF
1.187	1.346	OFF	OFF	OFF	ON	OFF
1.325	1.494	ON	OFF	OFF	ON	OFF
1.463	1.641	OFF	ON	OFF	ON	OFF
1.600	1.789	ON	ON	OFF	ON	OFF
1.738	1.936	OFF	OFF	ON	ON	OFF
1.876	2.084	ON	OFF	ON	ON	OFF
2.013	2.231	OFF	ON	ON	ON	OFF
2.151	2.379	ON	ON	ON	ON	OFF
2.289	2.526	OFF	OFF	OFF	OFF	ON
2.426	2.674	ON	OFF	OFF	OFF	ON
2.564	2.821	OFF	ON	OFF	OFF	ON
2.702	2.969	ON	ON	OFF	OFF	ON
2.839	3.116	OFF	OFF	ON	OFF	ON
2.977	3.264	ON	OFF	ON	OFF	ON
3.115	3.411	OFF	ON	ON	OFF	ON
3.252	3.559	ON	ON	ON	OFF	ON
3.390	3.706	OFF	OFF	OFF	ON	ON
3.528	3.854	ON	OFF	OFF	ON	ON
3.665	4.001	OFF	ON	OFF	ON	ON
3.803	4.149	ON	ON	OFF	ON	ON
3.941	4.296	OFF	OFF	ON	ON	ON
4.078	4.444	ON	OFF	ON	ON	ON
4.216	4.592	OFF	ON	ON	ON	ON
4.354	4.739	ON	ON	ON	ON	ON

TABLE 57 - FURNACE STATUS INPUT STAGED GAS HEAT

MIN VOLTS DC	MAX VOLTS DC	FURNACE 1 STATUS	FURNACE 2 STATUS	FURNACE 3 STATUS
0.086	0.166	OFF	OFF	OFF
0.224	0.313	ON	OFF	OFF
0.361	0.461	OFF	ON	OFF
0.499	0.609	ON	ON	OFF
0.637	0.756	OFF	OFF	ON
0.774	0.904	ON	OFF	ON
0.912	1.051	OFF	ON	ON
1.050	1.199	ON	ON	ON

FAULTS

A fault is defined as an abnormal condition, which results in the shutdown of an operating system or the complete unit. The presence of a fault condition indicates a situation in which possible damage to the unit may occur if the unit or system were allowed to continue to operate. There are four types of faults.

Unit Lockout

The complete unit is shutdown and locked out. A manual reset is required to restart the unit after the fault has been corrected.

System Lockout

One of the compressor systems or other component is shutdown and locked out. A manual reset is required to restart the system after the fault has been corrected.

Unit Auto Reset

The complete unit is shutdown but the unit will restart automatically when the fault condition is cleared.

System Auto Reset

One of the compressor systems or other component is shut down but the system or component will restart automatically when the fault condition is cleared.

A UNIT LOCKOUT can be reset by turning the “LOCAL STOP” switch off for 5 seconds and then back on. If the cause of the lockout has been corrected the unit will reset and begin proper operation.

A SYSTEM LOCKOUT except for COMPR # LOCKOUT and COMPR # LPCO SAFETY LOCKOUT can be reset by turning the “LOCAL STOP” switch OFF for 5 seconds and then back ON. A COMPR # LOCKOUT and COMPR # LPCO SAFETY LOCKOUT must be reset by entering the OPTIONS key and the COMPRESSOR SYSTEMS # subsection, which has the lockout. Then use the up and down arrow key to go to COMP SYS # STATUS. The current status will be LOCKOUT. Press the ✓ key and use the right arrow key to change LOCKOUT to RUN.

In addition to faults the User Interface will also display warnings. A warning is defined as an abnormal condition under which the unit continues to operate. Warnings will not require the unit to shut down; however, they may require the Unit Controller to disable certain functions that may result in the unit operating less efficiently or eliminate certain features.

Table 53 on page 167 lists the faults / warnings that will be displayed under the STATUS and HISTORY keys of the User Interface. When a fault is present line two of the effected STATUS screen display (UNIT-OVERALL STATUS, COMPRESSOR SYSTEM 1, COMPRESSOR SYSTEM 2, COMPRESSOR SYSTEM 3, HEATING SYSTEM, ECONOMIZER SYSTEM, SUPPLY SYSTEM, EXHAUST SYSTEM, VENTILATION SYSTEM, or SENSOR / MISC STATUS) will change nomenclature to indicate a WARNING, SAFETY TRIP, SAFETY FAULT, or SAFETY LOCKOUT is present. A fault / warning description, method of reset and conditions under which the information is displayed is also contained in the table. Additional information for each of the faults is contained under their respective part of *SECTION 5–SEQUENCE OF OPERATION* located in this IOM.

When a fault is declared, the Unit Controller will record the time of occurrence, the date of occurrence, and a complete unit snapshot at the time of each occurrence in the HISTORY buffer. This data can be retrieved using the HISTORY key of the User Interface.

The HISTORY buffer stores the data from the last ten faults from the most recent (HISTORY 01) to the oldest (HISTORY 10). No fault HISTORY is eliminated once recorded other than being “pushed off” of the end of the list by a new fault when the buffer becomes full.

Warnings are only displayed in the HISTORY buffer while they are active. When the problem that generated the WARNING is corrected the record is removed from the buffer. The Unit Controller does not record the time of occurrence, the date of occurrence, or a complete unit snapshot at the time of occurrence for a WARNING.

The HISTORY buffer is password protected and a level 2 password must be entered in order to view the data.

When the HISTORY key is pressed, the password prompt will appear. After the proper level 2 password has been entered the screen will show the first active warning. If there are no active warnings present, the first fault will be displayed. If there are no faults in the HISTORY buffer, the screen will display “NO FAULT.” See *History on page 131* for additional information on how to navigate through the HISTORY menu.

In addition to the items listed in *Table 53 on page 167*, the following items listed below are contained under the HISTORY key.

"COMPRESSOR SYSTEM (1,2,OR 3) CLEAR" - Whenever there is a compressor safety trip the Unit Controller initiates the "COMPR STATUS CLEAR TIME (1,2, OR 3)" timer. The Unit Control records the time it takes for the trip to clear. When the fault clears "COMPRESSOR SYSTEM (1,2,OR 3) CLEAR" shows the time it took for the fault to clear in the HISTORY buffer.

"COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT"– If the "COMPR STATUS CLEAR TIME (1,2, OR 3)" timer reaches 60 minutes a "COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT" will be indicated in the HISTORY buffer. In most cases this indicates the compressor circuit over current protector opened. The compressor circuit over current protector is a manual reset device and the circuit would not reset in the required 60 minute time frame. The STATUS key will display the message "COMP SYS (1,2,OR 3) STATUS" "SAFETY LOCKOUT." The Unit Controller locks out the corresponding compressor system when a "COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT" is declared.

"COMPR SYSTEM (1,2,OR 3) INHIBIT"–This WARNING indicates the compressor system safety circuit experienced a trip but reset prior to the exploration of the 60 minute reset time function. If the safety circuit does not reset in 60 minutes it will be replaced with a "COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT" message.

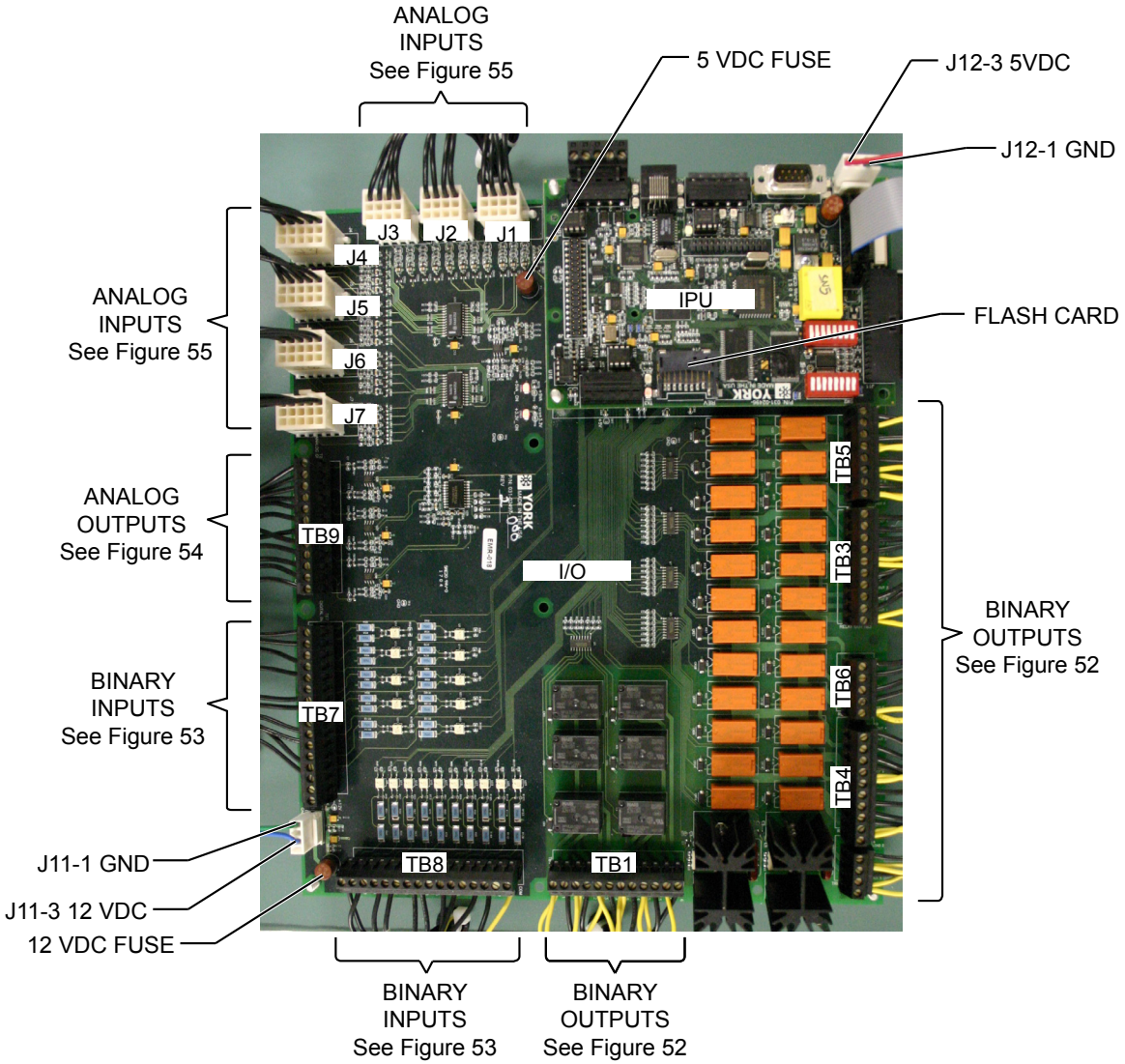

FIGURE 55 - I/O CONTROL BOARD

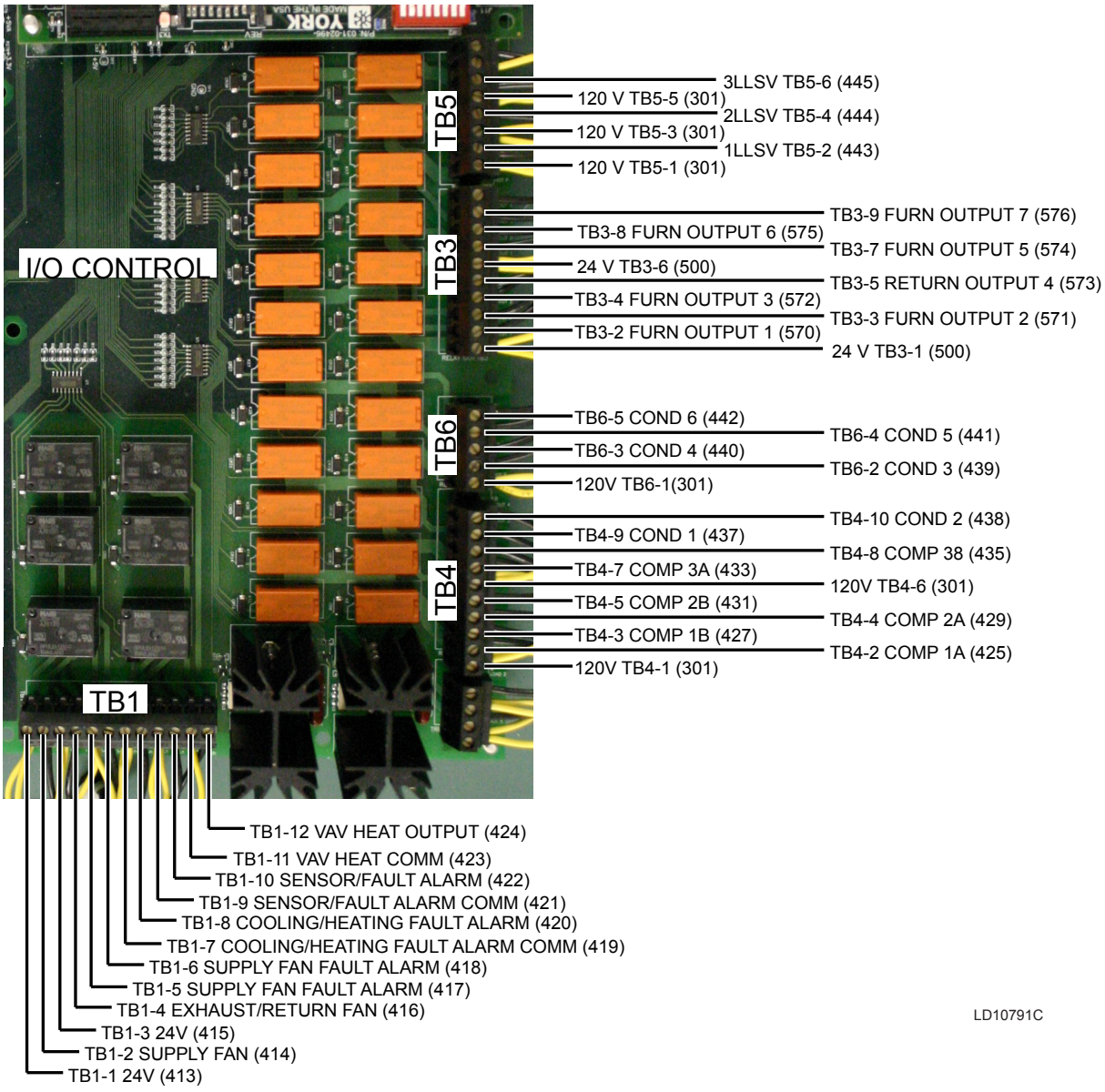

FIGURE 56 - I/O CONTROL BOARD - BINARY OUTPUTS

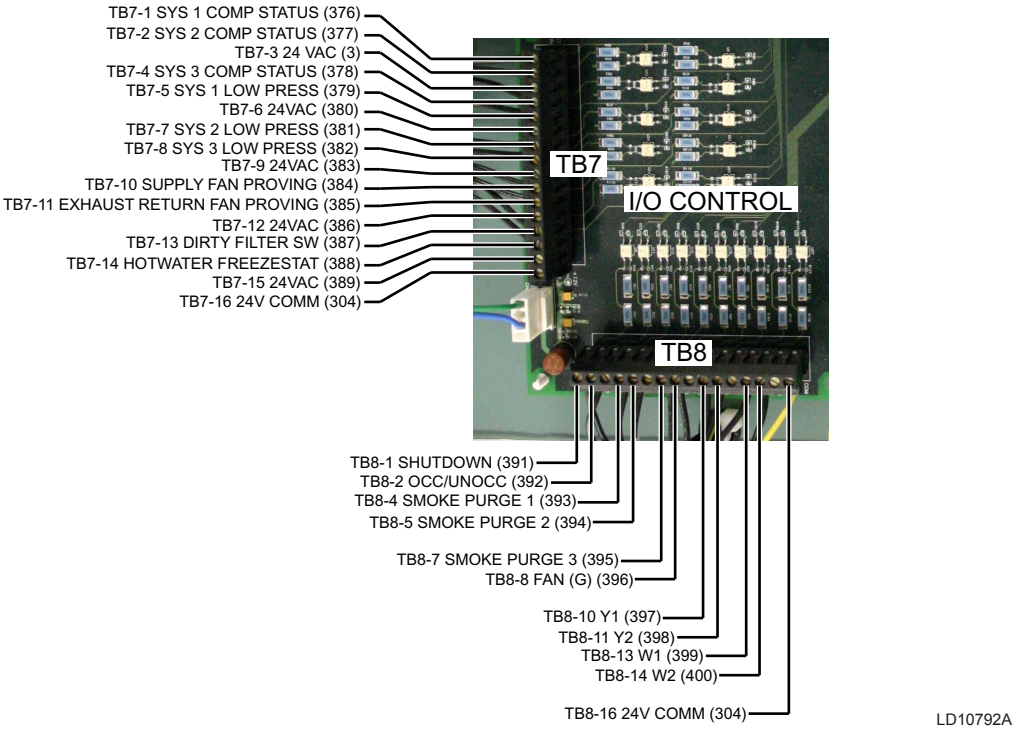

FIGURE 57 - I/O CONTROL BOARD - BINARY INPUTS

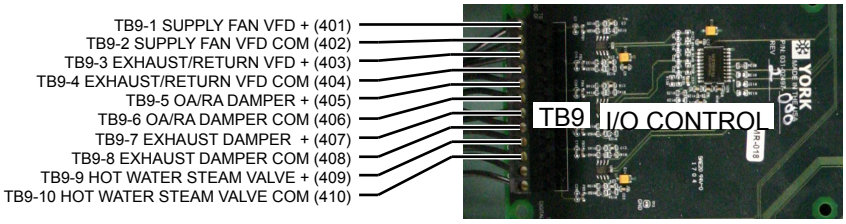

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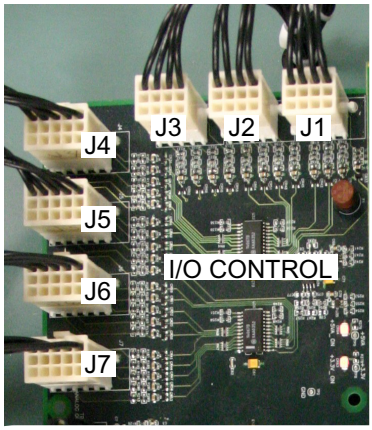
FIGURE 58 - I/O CONTROL BOARD - ANALOG OUTPUTS

5	4	3	2	1
10	9	8	7	6
15	14	13	12	11

J4, J5, J6, J7 PINOUTS



4	3	2	1
8	7	6	5
12	11	10	9

J1, J2, J3 PINOUTS

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FIGURE 59 - I/O CONTROL BOARD - ANALOG INPUTS (SEE *Table 52 on page 166* FOR PIN OUTS)

TABLE 58 - I/O CONTROL BOARD - ANALOG INPUT PIN OUTS

PIN NO.	SIGNAL
J1-1	INPUT SUPPLY AIR TEMP (308)
J1-5	SHIELD SUPPLY AIR TEMP
J1-9	REF SUPPLY AIR TEMP 5VDC (309)
J1-2	INPUT HEAT ENTER TEMP (310)
J1-6	SHIELD HEAT ENTER TEMP
J1-10	REF HEAT ENTER TEMP 5VDC (311)
J2-1	INPUT OA TEMP (314)
J2-5	SHIELD OA TEMP
J2-9	REF OA TEMP 5VDC (315)
J2-2	INPUT RA TEMP (316)
J2-6	SHIELD RA TEMP
J2-10	REF RA TEMP 5VDC (317)
J2-3	INPUT OA HUM (318)
J2-7	COM OA HUM (319)
J2-4	INPUT RA HUM (320)
J2-8	COM RA HUM (321)
J3-1	INPUT SUCT TEMP SYS1 (322)
J3-5	SHIELD SUCT TEMP SYS1
J3-9	REF SUCT TEMP SYS1 5VDC (323)
J3-2	INPUT SUCT TEMP SYS2 (324)
J3-6	SHIELD SUCT TEMP SYS2
J3-10	REF SUCT TEMP SYS2 5VDC (325)
J3-3	INPUT SUCT TEMP SYS3 (326)
J3-7	SHIELD SUCT TEMP SYS3
J3-11	REF SUCT TEMP SYS3 5VDC (327)
J3-4	INPUT SUCT PRESS SYS1 (328)
J3-8	COM SUCT PRESS SYS1 (329)
J3-12	REF SUCT PRESS SYS1 5VDC (330)
J4-1	INPUT SUCT PRESS SYS2 (331)
J4-6	COM SUCT PRESS SYS2 (332)
J4-11	REF SUCT PRESS SYS2 5VDC (333)
J4-2	INPUT SUCT PRESS SYS3 (334)
J4-7	COM SUCT PRESS SYS3 (335)
J4-12	REF SUCT PRESS SYS3 5VDC (336)

PIN NO.	SIGNAL
J4-3	INPUT DISCH PRESS SYS1 (337)
J4-8	COM DISCH PRESS SYS1 (338)
J4-13	REF DISCH PRESS SYS1 5VDC (339)
J4-4	INPUT DISCH PRESS SYS2 (340)
J4-9	COM DISCH PRESS SYS2 (341)
J4-14	REF DISCH PRESS SYS2 5VDC (342)
J4-5	INPUT DISCH PRESS SYS3 (343)
J4-10	COM DISCH PRESS SYS3 (344)
J4-15	REF DISCH PRESS SYS3 5VDC (345)
J5-1	INPUT GAS HEAT STATUS (542)
J5-6	COM GAS HEAT STATUS (543)
J5-11	REF GAS HEAT STATUS 5VDC (541)
J5-2	INPUT OA CO2 (348)
J5-7	COM OA CO2 (349)
J5-3	INPUT RA CO2 (350)
J5-8	COM RA CO2 (351)
J6-1	INPUT RETURN FAN PRESS (352)
J6-6	COM RETURN FAN PRESS (353)
J6-2	INPUT DUCT PRESS (354)
J6-7	COM DUCT PRESS (355)
J6-3	INPUT BLDG PRESS (356)
J6-8	COM BLDG PRESS (357)
J6-4	INPUT OA AIR PRESS 1 (358)
J6-9	COM OA AIR PRESS 1 (359)
J6-5	INPUT OA AIR PRESS 2 (360)
J6-10	COM OA AIR PRESS 2 (361)
J7-1	INPUT ZONE TEMP SENSOR (363)
J7-6	SHIELD ZONE TEMP SENSOR (364)
J7-11	REF ZONE TEMP SENSOR 5VDC (362)
J7-4	INPUT SAT RESET (371)
J7-9	COM SAT RESET (372)
J7-14	REF SAT RESET 5VDC (370)
J7-5	INPUT DUCT STATIC RESET (374)
J7-10	COM DUCT STATIC RESET (375)
J7-15	REF DUCT STATIC RESET 5VDC (373)

TABLE 59 - WARNING DESCRIPTION TABLE

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
WRN-BUILDING PRS	BUILDING STATIC PRES MORE THAN 0.45 IWG OR LESS THAN -0.45 IWG FOR 10 SECONDS. POWER EXHAUST REVERTS TO NONE OR ON/OFF.	AUTO RESET	POWER EXHAUST OTHER THAN NONE OR ON - OFF DAMPER	EXHAUST SYS STATUS WARNING	SENSOR/ MISC FAULT
WRN-CO2 SENSOR 1 OUTSIDE	OUTSIDE CO_2 SENSOR OUT OF RANGE FOR MORE THAN OR EQUAL TO 15 MINUTES.	AUTO RESET	VENTILATION CONTROL EQUALS DEMAND	VENTILATION SYS STATUS WARNING	SENSOR/ MISC FAULT
WRN-CO2 SENSOR 2 INSIDE	OUTSIDE CO_2 SENSOR OUT OF RANGE FOR MORE THAN OR EQUAL TO 15 MINUTES.	AUTO RESET	VENTILATION CONTROL EQUALS DEMAND	VENTILATION SYS STATUS WARNING	SENSOR/ MISC FAULT
WRN-COMPR SYSTEM * INHIBIT	SEE DESCRIPTION AT THE END OF THE TABLE.	AUTO RESET			COOLING HEATING FAULT
WRN-DIRTY FILTER 1	THE FILTER STATUS INPUT IS CLOSED FOR MORE THAN OR EQUAL TO 1 MINUTE.	AUTO RESET	DIRTY FILTER SWITCH IS INSTALLED	FILTER STATUS CHANGE	SENSOR/ MISC FAULT
WRN-DISCHARGE PRS SENSOR *	THE DISCHARGE PRESSURE FOR THAT SYSTEM IS OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	AUTO RESET	PRESS TRANS PKG IS ON FOR THE SYSTEM	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-DUCT PRS XDCR	SUPPLY FAN OUTPUT ON, SUPPLY FAN STATUS MUST BE RUNNING FOR 5 MINUTES, STATIC PRESS CURRENT LESS THAN OR EQUAL TO (0.333 X DUCT STATIC PRESS ACTIVE SP) FOR 30 SECONDS.	AUTO RESET	UNIT TYPE IS VAV	SUPPLY SYS STATUS WARNING	FAN FAULT
WRN-EXHAUST FAN	THE EXHAUST FAN OUTPUT IS ON FOR 45 SECONDS AND THE RUN VERIFICATION INPUT IS LOW (OPEN) FOR 10 SECONDS.	AUTO RESET	POWER EXHAUST OTHER THAN NONE	EXHAUST SYSTEM STATUS WARNING	SENSOR/ MISC FAULT
WRN-FREEZESTAT TRIP	THE HW/STEAM FREEZSTAT CIRCUIT GOES HIGH (CLOSED) BUT GOES LOW (OPEN) WITHIN 5 MINUTES.	AUTO RESET	HEATING SYSTEM TYPE EQUALS HOT WATER STEAM	SENSOR/ MISC STATUS WARNING	COOLING HEATING FAULT
WRN-FURNACE MULTIPLEXER FAULT	ON MODULATING GAS, THE HEAT BINARY OUTPUTS DO NOT MATCH THE GAS FURNACE STATUS INPUT. SEE *Table 50 on page 161* OR NO FURNACE STATUS INPUT ON STAGED GAS.	AUTO RESET	HEATING SYSTEM TYPE EQUALS MODULATING GAS OR STAGED GAS	SENSOR/ MISC STATUS WARNING	COOLING HEATING FAULT
WRN-GAS FURNACE	THE HEAT BINARY OUTPUTS DO NOT MATCH THE GAS FURNACE STATUS INPUT. SEE TABLE *Table 51 on page 161*.	AUTO RESET	HEATING SYSTEM TYPE EQUALS STAGED GAS		COOLING HEATING FAULT
WRN-HET SENSOR	THE HEAT ENTERING SENSOR IS OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	AUTO RESET	HEATING SYSTEM TYPE IS STAGED GAS OR ELECTRIC	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT

TABLE 53 - WARNING DESCRIPTION TABLE (CONT'D)

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
WRN-HIGH DP UNLOAD *#	BOTH COMPRESSOR ARE ON FOR THE SYSTEM AND THE DISCHARGE PRESS IS MORE THAN OR EQUAL TO THE SYSTEM UNLOADING PRESSURE FOR 10 SECONDS.	AUTO RESET	PRESS TRANS PKG IS ON FOR THE SYSTEM	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-LOW AMBIENT TEMP *	THE OUTDOOR TEMP IS LESS THAN OR EQUAL TO THE MECH COOL LOCKOUT TEMP.	AUTO RESET	LOW AMBIENT PKG IS NOT INSTALLED FOR THE SYSTEM	COMP SYS * STATUS LOW AMB INHIBIT	SENSOR/ MISC FAULT
WRN-LOW SUCTION TEMP *#	THE SUCTION TEMP IS LEES THAN THE SUCTION TEMP LOW LIMIT FOR 10 CONTINUOUS SECONDS.	AUTO RESET		COMP SYS * STATUS SUCTION TEMP UNL # ON	SENSOR/ MISC FAULT
WRN-OA FLOW PRS 1	REFER TO AIR MEASUREMENT STATION SENSOR FAULTS IN *SECTION 5–SEQUENCE OF OPERATION*	LOCKS OUT THE AIR MEASURING STATION	DAMPER HARDWARE IS TEK-AIR FULL IAQ	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-OA FLOW PRS 2	REFER TO AIR MEASUREMENT STATION SENSOR FAULTS IN *SECTION 5–SEQUENCE OF OPERATION*	LOCKS OUT THE AIR MEASURING STATION	DAMPER HARDWARE IS TEK-AIR FULL IAQ	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-OUTSIDE AIR RH	OUTSIDE AIR TEMP MORE THAN OR EQUAL TO 32.0°F FOR 10 SECONDS OUTDOOR AIR HUMIDITY LESS THAN 5% FOR 10 SECONDS.	AUTO RESET	ECONO INSTALLED SINGLE ENTHALPY OR DUAL ENTHALPY	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-RETURN AIR RH	RETURN AIR TEMP MORE THAN OR EQUAL TO 32.0°F FOR 10 SECONDS. RETURN AIR HUMIDITY LESS THAN 5% FOR 10 SECONDS.	AUTO RESET	ECONO INSTALLED DUAL ENTHALPY	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-RETURN FAN XDCR	SUPPLY FAN OUTPUT IS ON AND RETURN FAN PRESS CURRENT LESS THAN -0.95 IWG OR MORE THAN 0.95 IWG FOR 30 SECONDS OR SUPPLY FAN OUTPUT IS OFF AND RETURN FAN PRESSURE CURRENT LESS THAN -0.1 IWG OR MORE THAN 0.1 IWG FOR 5 MINUTES.	AUTO RESET	POWER EXHAUST TYPE IS RETURN FAN W/EXH OR RETURN FAN W/O EXH	SUPPLY SYS STATUS WARNING	FAN FAULT
WRN-SUCTION PRS SENSOR *	SUCTION PRESSURE OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	AUTO RESET	PRESS TRANS PKG IS ON FOR THE SYSTEM	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-SUCTION TEMP SENSOR * #	SUCTION TEMPERATURE SENSOR IS OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	AUTO RESET		SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT

* CAN BE 1, 2, OR 3 # CAN BE A OR B

TABLE 60 - FAULT AUTO - RESET

HISTORY SCREEN WORDING	DESCRIPTION	RESET	HOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
AUTO RESET-COMPRESSOR SYSTEM * CLEAR	SEE DESCRIPTION BELOW	AUTO RESET			
AUTO RESET-COMPRESS SYSTEM * TRIP 1	THE SAFETY INPUT CHAIN IS OPEN (FAULTED) FOR MORE THAN 2 SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE FIRST TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFVETY TRIP	COOLING HEATING FAULT
AUTO RESET COMPRESSOR SYSTEM * TRIP 2	THE SAFETY INPUT CHAIN IS OPEN (FAULTED) FOR MORE THAN 2 SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE SECOND TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFETY TRIP	COOLING HEATING FAULT
AUTO RESET-LOW SUCTION TEMP	EITHER IS COMPRESSOR ON AND THE TEMPERATURE - SUCTION IS LESS THAN OR EQUAL TO THE SUCTION LOW LIMIT FOR 10 CONTINUOUS SECONDS AND AFTER THE COMPRESSOR WAS TURNED OFF THE TEMPERATURE DID NOT RISE ABOVE THE LIMIT.	AUTO RESET		COMP SYSTEM * STATUS SAFETY FAULT	SENSOR/ MISC FAULT
AUTO RESET-LPCO * TRIP 1	THE LOW PRESSURE CUTOUT INPUT CHAIN IS OPEN (FAULTED) FOR MORE THAN 2 SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE FIRST TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFVETY TRIP	COOLING HEATING FAULT
AUTO RESET-LPCO * TRIP 2	THE LOW PRESSURE CUTOUT INPUT CHAIN IS OPEN (FAULTED) FOR MORE THAN 2 SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE SECOND TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFVETY TRIP	COOLING HEATING FAULT
AUTO RESET - POWER FAIL	POWER IS LOST WHEN THE UNIT OPERATING STATE IS RUN.	AUTO RESET			
AUTO RESET - RAT SENSOR	RETURN AIR TEMP CURRENT SENSOR IS OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	AUTO RESET		SENSOR/ MISC STATUS SAFETY FAULT	SENSOR/ MISC FAULT
AUTO RESET - REMOTE I/O COMM	NO COMMUNICATION FROM THE I/O BOARD FOR MORE THAN OR EQUAL TO 5 SECONDS.	AUTO RESET			SENSOR/ MISC FAULT
AUTO RESET - STAGED INPUT	THE CONTROL HAS A COOLING AND HEATING THERMOSTAT INPUT AT THE SAME TIME FOR A PERIOD GREATER THAN 10 SECONDS.	AUTO RESET		SENSOR/ MISC STATUS SAFETY LOCKOUT	SENSOR/ MISC FAULT

TABLE 54–FAULT AUTO - RESET (CONT'D)

HISTORY SCREEN WORDING	DESCRIPTION	RESET	HOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
AUTO RESET - ZONE TEMP SENSOR	ZONE TEMP CURRENT SENSOR IS OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	AUTO RESET	UNIT TYPE IS VAV AND NIGHT SET BACK IS USER ENABLED OR UNIT TYPE IS SET TO SZVAV AND THE CONTROL METHOD IS SET TO ZONE SENSOR HARDWIRED.	SENSOR/ MISC STATUS SAFETY LOCKOUT	SENSOR/ MISC FAULT

* CAN BE 1, 2, OR 3 # CAN BE A OR B

TABLE 61 - FAULTS LOCKOUT

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
LOCKOUT-COMPRESSOR SYSTEM * TIME OUT	SEE BELOW.	SYSTEM LOCKOUT		COMP SYSTEM * - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT - COMPRESSOR SYSTEM *	HIGH PRESS SW, COMP MOTOR PROTECTOR, OR OVERCURRENT PROTECTOR OPEN - 3 TIMES IN 120 MINUTES ON COMP SYSTEM*.	SYSTEM LOCKOUT		COMP SYSTEM * - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT-HIGH DUCT PRESSURE	DUCT STATIC PRESS CURRENT .+ DUCT STATIC OVER PRESSURE.	UNIT LOCKOUT	UNIT TYPE IS VAV	SUPPLY SYS STATUS SAFETY LOCKOUT	FAN FAULT
LOCKOUT - HOT WATER FREEZE	THE HYDRONIC FREEZE STAT SWITCH REMAINED CLOSED MORE THAN OR EQUAL TO 5 MINUTES.	UNIT LOCKOUT	HEAT TYPE HOT WATER / STEAM	HEATING SYS STATUS - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT-LPCO	LOW PRESSURE CUTOUT OPEN - 3 TIMES IN 120 MINUTES ON COMPR SYSTEM*.	SYSTEM LOCKOUT		COMP SYSTEM * - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT - MANUAL STOP *	THE COMPRESSOR SYSTEM HAS BEEN PLACED IN THE STOP MODE EITHER THROUGH THE USER INTERFACE OR BY A COMMUNICATED INPUT.	SYSTEM LOCKOUT		COMP SYS * STATUS DISABLED	
LOCKOUT - MANUAL UNIT STOP	THE UNIT IS SHUT DOWN THROUGH THE SHUT DOWN SWITCH ON THE UNIT OR BY AN EXTERNAL HARDWIRED OR COMMUNICATED INPUT.	UNIT LOCKOUT		UNIT - OVERALL STATUS LOCAL STOP	

TABLE 55–FAULTS LOCKOUT (CONT'D)

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
LOCKOUT - OAT SENSOR	OUTSIDE AIR TEMP SENSOR IS OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	UNIT LOCKOUT		COMP SYS * STATUS SAFETY LOCKOUT; ECONO SYS STATUS SAFETY LOCKOUT	SENSOR/ MISC FAULT
LOCKOUT - RETURN FAN	RETURN FAN STATUS IS LOW AND TIME FROM START MORE THAN OR EQUAL TO 30 SEC UNIT LOCKOUT.	UNIT LOCKOUT	POWER EXHAUST TYPE IS RETURN FAN W/EXH OR RETURN FAN W/O EXH AND THE SUPPLY FAN IS ON	UNIT - OVERALL STATUS UNIT LOCKOUT	FAN FAULT
LOCKOUT - SAT SENSOR	SUPPLY AIR TEMP CURRENT SENSOR IS OUT OF RANGE FOR MORE THAN OR EQUAL TO 10 SECONDS.	UNIT LOCKOUT	UNIT TYPE IS SZVAV OR VARIABLE AIR VOLUME		SENSOR/ MISC FAULT
LOCKOUT- SUPPLY FAN	SUPPLY FAN STATUS IS LOW AND TIME FROM START MORE THAN OR EQUAL TO 30 SEC UNIT LOCKOUT.	UNIT LOCKOUT		UNIT - OVERALL STATUS UNIT LOCKOUT	FAN FAULT

* CAN BE 1, 2, OR 3

*"WRN - COMP SYSTEM * INHIBIT"* - This WARNING indicates the compressor system safety circuit experienced a trip but reset prior to the exploration of the 60 minute reset time function. If the safety circuit does not reset in 60 minutes it will be replaced with a *"LOCKOUT - COMPRESSOR SYSTEM * TIME OUT"* message.

*"AUTO RESET - COMPRESSOR SYSTEM * CLEAR"* - When ever there is a compressor safety trip the Primary Unit Controller initiates the *"COMPR STATUS CLEAR TIME *"* timer. The Primary Unit Control records the time it takes for the trip to clear. When the fault clears *"COMPRESSOR SYSTEM * CLEAR"* shows the time it took for the fault to clear in the HISTORY buffer.

*"LOCKOUT-COMPRESSOR SYSTEM * TIME OUT"*–If the *"COMPR STATUS CLEAR TIME *"* timer reaches 60 minutes a *"LOCKOUT - COMPRESSOR SYSTEM * TIME OUT"* will be indicated in the HISTORY buffer.

TABLE 62 - 150-TON STAGING

STEP	SYSTEM 1 COMPRESSORS		SYSTEM 2 COMPRESSORS		SYSTEM 3 COMPRESSORS		% OF TOTAL CAPACITY
	ONE	BOTH	ONE	BOTH	ONE	BOTH	
1	On	Off	Off	Off	Off	Off	11%
2	Off	Off	On	Off	Off	Off	15%
3	Off	Off	Off	Off	On	Off	24%
4	Off	Off	On	On	Off	Off	30%
5	On	On	On	Off	Off	Off	37%
6	On	On	Off	Off	On	Off	46%
7	On	Off	On	Off	On	Off	50%
8	Off	Off	On	On	On	Off	54%
9	On	Off	Off	Off	On	On	59%
10	Off	Off	On	Off	On	On	63%
11	On	On	Off	Off	On	On	70%
12	Off	Off	On	On	On	On	78%
13	On	Off	On	On	On	On	89%
14	On	On	On	On	On	On	100%

TABLE 63 - 130-TON STAGING

STEP	SYSTEM 1 COMPRESSORS		SYSTEM 2 COMPRESSORS		SYSTEM 3 COMPRESSORS		% OF TOTAL CAPACITY
	ONE	BOTH	ONE	BOTH	ONE	BOTH	
1	On	Off	Off	Off	Off	Off	12%
2	Off	Off	On	Off	Off	Off	18%
3	Off	Off	Off	Off	On	Off	20%
4	On	Off	On	Off	Off	Off	30%
5	On	Off	Off	Off	On	Off	32%
6	On	On	On	Off	Off	Off	42%
7	On	Off	On	Off	On	Off	50%
8	On	On	On	On	Off	Off	59%
9	On	On	On	Off	On	Off	62%
10	On	Off	On	On	On	Off	68%
11	On	Off	On	Off	On	On	70%
12	On	On	On	On	On	Off	80%
13	On	Off	On	On	On	On	88%
14	On	On	On	On	On	On	100%

TABLE 64 - 120-TON STAGING

STEP	SYSTEM 1 COMPRESSORS		SYSTEM 2 COMPRESSORS		SYSTEM 3 COMPRESSORS		% OF TOTAL CAPACITY
	ONE	BOTH	ONE	BOTH	ONE	BOTH	
1	Off	Off	On	Off	Off	Off	14%
2	Off	Off	Off	Off	On	Off	23%
3	Off	Off	On	On	Off	Off	27%
4	Off	Off	On	Off	On	Off	36%
5	On	Off	On	On	Off	Off	41%
6	Off	Off	Off	Off	On	On	45%
7	Off	Off	On	On	On	Off	50%
8	On	On	On	On	Off	Off	55%
9	Off	Off	On	Off	On	On	59%
10	On	Off	On	On	On	Off	64%
11	Off	Off	On	On	On	On	73%
12	On	On	On	On	On	Off	77%
13	On	Off	On	On	On	On	86%
14	On	On	On	On	On	On	100%

MULTI MEDIA CARD

The Unit Controller is made up of two separate control boards, the PLUG IN I/O board and the IPU board. All the digital and analog inputs and outputs are connected to the PLUG IN I/O control. All the system logic is contained on the PLUG IN I/O board. The IPU board mounts on top of the PLUG IN I/O board and handles the communication between the PLUG IN I/O board and the User Interface. Another feature of this control system is the availability to connect a MULTI MEDIA CARD to the IPU board. The MULTI MEDIA CARD allows operational data to be continuously saved and used for the diagnosis of unit operating problems.

A MULTI MEDIA CARD is similar to a hard drive in a PC. It has a directory structure and files are saved on it. The difference between a hard drive and the MULTI MEDIA CARD is that the MULTI MEDIA CARD is made of non-volatile flash memory. This allows the MULTI MEDIA CARD to be removed from the IPU board and placed in a PC for data analysis without the lost of any data.

The MULTI MEDIA CARD is considered a Service tool and as such is controlled through the SERVICE key of the User Interface. Entry into the SERVICE screen requires a Level 2 password.

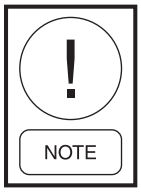
Data is continuously stored to the MULTI MEDIA CARD in root and subdirectories. The root directories are set up by month and year, under each of the root directories are subdirectories for each day. For example the data for January 11, 2005, would be stored in a root directory identified by Rm200501, the year followed by the month. The subdirectory for this day would be identified as 20050111.csv, the year followed by the month, followed by the day. Each of these files contains all the data monitored for the day specified by the file name.

All connected Analog Inputs, Analog Outputs, Digital Inputs, Digital Outputs, Serial Data and Derived Data will be collected. The data will be collected once every 5 seconds and stored in the same order as in the History buffer. Each line of data will be timed and date stamped. Each file will include a header line detailing what data is stored in each column.

The collected data can be analyzed using a PC. The MULTI MEDIA CARD can be inserted into a MULTI MEDIA CARD reader attached to the PC. The data can be analyzed using Excel or another data analysis tool.

To install or remove the MULTI MEDIA CARD from the IPU board “DATA LOG FORMAT” must be set to off. This is done through the SERVICE screen of the User Interface. When the MULTI MEDIA CARD is installed the operation can be programmed to “UNCOMPRESSED” in which case data will be recorded every 5 seconds or “SKIP UNCHANGED” which is the same as “UNCOMPRESSED” except values are only saved when they change.

If an error occurs when writing to the MULTI MEDIA CARD, “DATA LOG ERROR STATE” and “DATA LOG ERROR DETAIL” will appear under the SERVICE screen. “DATA LOG ERROR STATE” indicates what operation failed and “DATA LOG ERROR DETAIL” will give the error code from the operation. *Table 59 on page 174* gives a description of the “DATA LOG ERROR STATE” and *Table 60 on page 175* gives a description of the “DATA LOG ERROR DETAIL.”



The SD card cannot exceed 2 MB for data logging or software updates. Not all SD cards are compatible with the IPU system.

TABLE 65 - DATA LOG ERROR STATE

DATA LOG ERROR STATE	AN ERROR OCCURRED WHEN DOING THIS:
1	Mounting the flash card
2	Opening the root directory
3	Reading the root directory
4	Closing the root directory
5	Opening a sub-directory
6	Reading a sub-directory
7	Closing a sub-directory
8	Deleting an old directory
11	Creating a directory
14	Creating a file
15	Open a file
16	Write a file
17	Delete a file
18	Close a file

TABLE 66 - DATA LOG ERROR LOG DETAIL

DATA LOG ERROR DETAIL	THIS ERROR OCCURRED:
1	Not permitted
2	No such entity
3	No such process
4	Operation interrupted
5	I/O error
6	Bad file handle
11	Try again later
12	Out of memory
16	Resource busy
19	No such device
20	Not a directory
21	Is a directory
22	Invalid argument
23	Too many open files in system
27	File too large
28	No space left on device
29	Illegal seek
30	Read-only file system
60	File name too long

TABLE 67 - ACRONYMS

ACRONYM/ ABBREVIATION	DEFINITION
"	SYMBOL FOR INCHES
AMB	AMBIENT
BAS	BUILDING AUTOMATION SYSTEM
BLDG	BUILDING
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET per MINUTE
CFSTGDN	CONDENSER FAN STAGE DOWN
CFSTGUP	CONDENSER FAN STAGE UP
COMM	COMMUNICATION/COMMUNICATED
COMP	COMPRESSOR
CTB	CONTROL TERMINAL BOARD
DAMP	DAMPER
°F	DEGREES FAHRENHEIT
DEHUM	DEHUMIDIFY/DEHUMIDIFICATION
DEWPT	DEW POINT
DP	REFRIGERANT DISCHARGE PRESSURE
ECONO	ECONOMIZER
EVAP	EVAPORATOR
G	THERMOSTAT TERMINAL FOR SUPPLY FAN

TABLE 61 - ACRONYMS (CONT'D)

ACRONYM/ ABBREVIATION	DEFINITION
HCO	HEATING CONTROL OFFSET
HGRH	HOT GAS REHEAT
HPCO	HIGH PRESSURE CUT-OUT
HW	HOT WATER
IAQ	INDOOR AIR QUALITY
IWG	INCHES OF WATER GAUGE
LPCO	LOW PRESSURE CUT-OUT
MAX	MAXIMUM
MIN	MINIMUM
MOD	MODULATING
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE
OCC	OCCUPIED
POS	POSITION
PRESS	PRESSURE
PSI	POUNDS per SQUARE INCH
R/W	READ/WRITE
RA	RETURN AIR
RAT	RETURN AIR TEMPERATURE
RH	RELATIVE HUMIDITY
SA	SUPPLY AIR
SAT	SUPPLY AIR TEMPERATURE
SP	REFRIGERANT SUCTION PRESSURE
SUCT	SUCTION
SZVAV	SINGLE ZONE VARIABLE AIR VOLUME
UNL	UNLOADER/UNLOADING
UNOCC	UNOCCUPIED
VAC	VOLT A/C
VAV	VARIABLE AIR VOLUME
VDC	VOLTS D/C
VFD	VARIABLE FREQUENCY DRIVE
W/	WITH
W/O	WITHOUT
W1	THERMOSTAT TERMINAL FOR 1ST STAGE HEATING
W2	THERMOSTAT TERMINAL FOR 2ND STAGE HEATING
WC	WATER COLUMN
Y1	THERMOSTAT TERMINAL FOR 1ST STAGE COOLING
Y2	THERMOSTAT TERMINAL FOR 2ND STAGE COOLING